TITLE

THE STRUCTURE AND INFRASTRUCTURE OF CHINESE SCIENCE AND TECHNOLOGY

BY

Dr. Ronald N. Kostoff
Office of Naval Research
875 N. Randolph St.
Arlington, VA 22217
Phone: 703-696-4198
Fax: 703-696-8744
Internet: kostofr@onr.navy.mil

LTCOL Michael B. Briggs
Marine Corps Warfighting Laboratory
3255 Meyers Ave
Quantico, VA 22134

Mr. Robert L. Rushenberg
DDL-OMNI Engineering, LLC
8260 Greensboro Drive
Mclean, VA 22102

Ms. Christine A. Bowles
DDL-OMNI Engineering, LLC
8260 Greensboro Drive
Mclean, VA 22102

Dr. Michael Pecht
University of Maryland
College Park, MD 20742

(THE VIEWS IN THIS REPORT ARE SOLELY THOSE OF THE AUTHORS, AND DO NOT NECESSARILY REPRESENT THE VIEWS OF THE DEPARTMENT OF THE NAVY OR ANY OF ITS COMPONENTS, DDL-OMNI ENGINEERING, LLC, OR THE UNIVERSITY OF MARYLAND)

KEYWORDS

China; Science and Technology; Bibliometrics; Citation Analysis; Impact Factor; Computational Linguistics; Core Competencies; Research Evaluation; CLUTO; Nanotechnology; Clustering; Taxonomies.

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE **2006**	2. REPORT TYPE **N/A**	3. DATES COVERED **-**

4. TITLE AND SUBTITLE **The Structure and Infrastructure of Chinese Science and Technology**	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Office of Naval Research Dr. Ronald Kostoff 875 N. Randolph Street Arlington, VA 22217**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR’S ACRONYM(S)
	11. SPONSOR/MONITOR’S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**SAR**	**503**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

TABLE OF CONTENTS

TABLE OF CONTENTS

1 ABSTRACT

This report identifies and analyzes the science and technology core competencies of China. The first part of the study was performed in the 2003-2004 time frame, and analyzes databases containing 2000-2003 data for China. The second part of the report was sponsored in part by ONR Global, and contains an analysis of 2005 data from China.

For the first part of the study, aggregate China publication and citation bibliometrics were obtained, and manual and statistical taxonomies were generated. The manual taxonomy was based on reading a random sample of ten percent of all China records retrieved, and included many manually-assigned attributes for each record. The statistical taxonomies were based on both word/ phrase clustering and document clustering.

For the second part of the study, one hierarchical research taxonomy, based on document clustering, was generated. The second hierarchical level of this research taxonomy for 2005 records contains four categories: 1) chemistry (5841 records); 2) physics/ materials (13966 records); 3) mathematics (7162 records); life sciences (7377 records). The physics/ materials category has almost three times as many records as the chemistry category, and twice the records of the mathematics category. Detailed analysis of the taxonomy allowed four representative technical topics to be identified (nanotechnology; genetics; alloys; crops), and bibliometrics analysis was performed for each topic. Use of bibliometrics (e.g., key researchers, Centers of Excellence, core journals) allowed the infrastructure of these technical areas to be identified.

Two unique approaches were developed to compare characteristics of China's science and technology output with that of other countries. First, a novel method was used to compare the impact/ quality of all of China's research with that of two other countries, India and Australia. Second, a unique approach was used to compare China's research investment emphases/ strategy relative to that of the USA.

China's output of research articles has expanded dramatically in the last decade. In terms of sheer numbers of research articles, especially in critical technologies (e.g., nanotechnology, energetic materials), it is among the leaders. In terms of citation impact, it was higher than India in all major categories (e.g., Physical, Environmental, Materials, and Life Sciences), but was lower than Australia in all these major categories. In terms of investment strategy relative to that of the USA, China is investing more heavily in the hard science areas that underpin modern defense and commercial activities, whereas the USA is investing more heavily in the medical, psychological, and social problem (e.g., drug use) science areas that underpin improvement of individual health and comfort.

EXECUTIVE SUMMARY

BACKGROUND

Core Competencies

The core competence concept was initially promulgated in 1990 as "an area of specialized expertise that is the result of harmonizing complex streams of technology and work activity" (Hamel and Prahalad, 1990). It was developed for a business context, and reflected the collective learning and coordination skills underlying a firm's product lines. According to the original proposers, core competencies are the source of competitive advantage and enable the firm to introduce an array of new products and services. They lead to the development of core products, which are then used to develop a larger number of end user products.

Since the original core competence article, many follow-on studies have been performed. Other definitions of core competence have been advanced (e.g., Galunic and Rodan, 1998). However, common features among the different core competence definitions include the following:

- Critical mass of people
- Synergy of coordinated sub-disciplines
- High quality output
- Unique capabilities
- Substantial fraction of organization's total development investment

While the original definition, and most follow-on definitions, have applied to business organizations, the concept can be extrapolated to nations. The five features above characterize national core competencies. In the present paper, a national research core competence is defined as a technical area that 1) contains a critical mass of researchers; 2) consists of coordinated and synchronized sub-disciplines; 3) produces high quality output; 4) offers unique national capabilities; and 5) contains a visible fraction of research investment. In other words, a national research core competence is a synergy of individual expertise that is aggregated and coordinated over multiple technical disciplines, and is expressed as a national research strategic investment.

The text mining approach of the present paper will address a sub-set of the above features (identification of China's main research thrusts, volume of research output in main research thrusts, relative quality of selected major research thrusts) to assess potential Chinese research competencies. Further subjective analysis (beyond the scope of the present paper) is required to characterize the remaining necessary features of a national core competence.

This paper will not discuss the desirability of employing core competencies in managing research. The first author has consulted with companies and agencies on practical aspects of implementing core competencies in research management. Within an organization,

development of research core competencies tends to receive preferential and protected funding, which are very important in times of economic turndown. Serious employee morale problems can result for those researchers who are not associated with core competence development, since they have been placed in a more vulnerable position. The alternative, defining all the organization's development thrusts as core competencies, dilutes the purpose of utilizing core competencies to help manage research, and renders them ineffective.

Country Technology Assessments

National science and technology (S&T) core competencies represent a country's strategic capabilities in S&T. Knowledge of country core competencies is important for myriad reasons:

a) Priority technical areas for joint commercial or military ventures
b) Assessment of a country's military potential
c) Knowledge of emerging areas to avoid commercial or military surprise

Obtaining such global technical awareness, especially from the literature, is difficult for multiple reasons:

a) Much science and technology performed is not documented
b) Much documented science and technology is not widely available
c) Much available documented science and technology is expensive and difficult to acquire
d) Few credible techniques exist for extracting useful information from large amounts of science and technology documentation (Kostoff, 2003a)

Most credible country technology assessments are based on a combination of personal visitations to the country of interest, supplemented by copious reading of technology reports from that country. Such processes tend to be laborious, slow, expensive, and accompanied by large gaps in the knowledge available. The more credible and complete evaluation processes will focus on selected technologies from a particular country, and provide in-depth analysis.

For the past half century, driven mainly by the Cold War, a large number of country technology assessments were performed (e.g., Bostian et al, 2000; Leneman, 1984; Stares, 1985; Hutubessy et al, 2002; Mooney and Seymour, 1996; McIntire, 2003; Campbell et al, 1985; Klinger, 1990; Gray et al, 1993; Lanzerotti et al, 1986; Duncan et al, 1988; Spencer et al, 1989; Davidson et al, 1990). The last decade has seen an expansion in focus to technologies of major economic competitors. Over the past two decades, some of the most credible of these country technology assessments have come from two organizations: World Technology Evaluation Center (WTEC-Loyola Univ) and Foreign Applied Sciences Assessment Center (FASAC-SAIC). In conducting their studies, both of these organizations would gather topical literature from the country of interest, assemble teams of experts in the topical area, have the teams review the

literature as well as conduct site visitations, and have the teams brief their findings and write a final report. The studies performed by these groups remain seminal approaches to country technology assessments.

Text Mining Technology Assessments

The first author's group has been developing text mining approaches to extract useful information from the global science and technology literature for the past decade (e.g., Kostoff, 2003a; Kostoff et al, 1997, 1998a, 1999, 2000a, 2000b, 2001a, 2001b, 2002, 2004a, 2004b, 2004c, 2005a, 2005b, 2005c, 2005d, 2006a, 2006b). These studies have typically focused on a technical discipline, and have examined global S&T efforts in this discipline. It is believed that such approaches, with slight modification, could be adapted to identifying the core S&T competencies in selected countries or regions, including estimation of the relative levels of effort in each of the core technology areas. It is also believed that coupling of the text mining approach with WTEC and FASAC approaches would amplify the strengths of each approach and reduce the limitations. The text mining component would be performed initially to identify:

- Key core competencies and technology thrusts in the country of interest
- Key interdisciplinary thrusts
- Approximate levels of efforts in technology-specific competency areas and in interdisciplinary areas
- Highly productive researchers
- Highly productive Centers of Excellence, including those not well known
- Highly cited researchers

Once the key technologies, researchers, and Centers of Excellence had been identified, then site visitation strategies could be developed. The second phase of the effort would be the actual site visitations. A key step in this hybrid process would be demonstration of the ability of text mining to identify the targets of interest with reasonable precision in a timely manner at an acceptable cost. These three driving parameters (performance, time, cost) could be traded-off against each other to provide a balance acceptable and tailored to a variety of potential customers.

China's Science and Technology Enterprise

China's R&D Expenditures

China regards basic research as the foundation of the development of future technologies, as well as a driving force for sustainable long-term development of its economy (Jiang, 1997; Peoples Daily Online, 2000; Chinese Embassy, 2005). As a developing country China's current S&T development policy requires that available resources be concentrated on the development of selected high technologies that are key to the nation's economic development. In fact, this kind of policy and strategy has been applied to many other government-funded development programs, such as China's military

modernization programs (Cox, 1999). Strengthening basic research has been a goal during the ninth and now the Tenth FYP periods. Both FYPs called for efforts to make breakthroughs in selected areas (MOST, 2005).

Since 1997-1998, China's Gross Expenditure on Research and Development (GERD) growth has been slightly higher than the Gross Domestic Product (GDP) growth, reflecting the government's accelerated effort in S&T development. China has been encouraging product-development R&D activities to make S&T contribute to its economic development. For example, in 2002, 75 percent of the nation's R&D spending went to product development and another 19 percent to applied research (MOST, 2003). In 2002, the Chinese Academy of Science (CAS) increased its spending on basic research to 40 percent of its total outlay, aiming at Nobel-level fundamental research. It has also taken measures to increase its scientists' creativity (Hsiung, 2002).

Despite this, many Chinese scientists argue that basic research is seriously under funded. In 2001, China's basic research funding in the country was 5.3 percent of total R&D expenditures, compared with a ratio of 16 to 20 percent in the United States, Western Europe, and Japan (Blanpied, 2002). In 2003 China had about 0.86 million people involved in R&D activities, compared with 1.26 million in the U.S. and about 0.67 million in Japan (Xinhua, 2003). China's R&D spending remains at a low level in terms of the GERD-GDP ratio compared with several scientifically-important developed countries, and this situation is unlikely to change significantly in the near future. In 2003 the ratio of China's GERD to its GDP was 1.3 percent compared to 2.6 percent for the US and 3.3 percent for Japan. China's goal for spending on R&D by 2005 is for 1.5 percent of GDP.

In 2004, state-owned enterprises accounted for 66.83 percent of the total R&D performed in the country, R&D institutes for 21.95 percent, and universities for 10.22 percent (MOST, 2005). China (like most developed scientific countries, including the United States and Japan) also encourages non-government sectors to support R&D from their own funds. In 2003, governments (central and provincial) contributed 29.9 percent of total R&D support in China, enterprises 60.1 percent, foreign sources 2 percent, and the remaining 8% accounted for by unspecified "other" sources. However, among the enterprises' expenditures, it was estimated that approximately half of the amount for R&D came from state-owned enterprises (SOEs), and thus indirectly from the central government. If so, then 62 percent of China's R&D expenditures in 2004 came either directly or indirectly from government and only 29 percent purely from private enterprises. In the United States, private industry accounts for over 65 percent of all R&D support, with government accounting for somewhat less than 30 percent. In Japan, private industry accounts for a slightly higher percentage of total R&D support than in the United States, and government for slightly less (NSB, 2004).

China's S&T Organizational Structure

The State Council of the central government is the highest administrative body of China. There are 6 major ministry-level administrative organizations directly under the State

Council that handle the nation's S&T development activities. A Leading Group on Science and Technology, chaired by the Prime Minister, is located organizationally between the State Council and these administrative organizations. However, most observers agree that it is relatively ineffective in setting R&D priorities. These organizations include the Ministry of Science and Technology (MOST), the Ministry of Education (MOE), the Commission of Science, Technology and Industry for National Defense (COSTIND), the Chinese Academy of Sciences (CAS), the Chinese Academy of Engineering (CAE), and the National Natural Science Foundation of China (NSFC) (Hsiung, 2002). Among those organizations, MOST, COSTIND, and MOE have policy-making authority, in addition to varying degrees of funding authority; CAS (which receives substantial funds from the government as a budget line item to support its research activities) and CAE have advisory power; and NSFC provides research funds.

APPROACH AND RESULTS

Overview

Two major types of information are required for a country S&T core competency assessment. One is technical infrastructure, which encompasses the prolific performers, journals that contain many of the papers, the prolific institutions, and the most cited papers/ authors/ journals. The other is technology thrusts, and the relationship among the thrusts. This study focused on obtaining both types of information.

Two types of results are presented, bibliometrics and taxonomies. Bibliometrics provide an indication of the technical infrastructure (prolific authors, journals, institutions, citations), while taxonomies provide an indication of major technology thrusts and their relationships.

In addition, a citation-based approach was used to identify pervasive research thrusts in China, and compare their investment and impact with those of other countries. This approach is described in detail later in this report. Basically, this approach identifies high frequency technical phrases from analysis of the retrieved China records, retrieves SCI records using selected phrases, and examines citation metrics from these records relative to those from similar countries. Physical, Environmental, Engineering, and Life Sciences records/ themes were included in this analysis.

Databases and Information Retrieval Approach

The Science Citation Index (SCI) database and the Engineering Compendex (EC) were used. The retrieved database used for analysis consists of selected journal records (including the fields of authors, titles, journals, author addresses, author keywords, abstract narratives, and references cited for each paper) obtained by searching the Web version of the SCI for articles that contained at least one author with a China address. At the time the final data was extracted for the computational linguistics component of this paper, the version of the SCI used accessed about 5600 journals (mainly in physical, engineering, and life sciences basic research), and the version of the EC used accessed

about 5000 journals (mainly in applied research, technology development, and engineering).

Sample records were extracted from the SCI for two different years, 2002 and 2005, and from the EC for years 2000-2003. There were 7780 records with Abstracts retrieved from the SCI for 2002, 34834 records with Abstracts retrieved from the SCI for 2004-2005, and 9949 records with Abstracts retrieved from the EC for 2000-2003. The Abstracts were used for the computational linguistics (phrase analyses, document clustering). For the India and Australia research impact comparisons with China, records were extracted from 1998 for each country using specific technology queries, and citations of those records compared. For the China-USA investment strategy comparison, records were extracted from the SCI for 2005 for each country for specific technology queries, and numbers of those records compared. Finally, for the aggregate China bibliometrics analysis, 2004-2005 records were extracted for the publication bibliometrics and 2002 records for the citation bibliometrics. For the selected category bibliometrics analysis, records were extracted covering the time frame 2003-early 2005.

Bibliometrics

The first group of bibliometrics results provides a summary view of the Chinese research infrastructure. The second group of bibliometrics results is for selected topics identified from the clustering of research articles by topical similarity.

Publication Statistics on Authors, Journals, and Organizations

The first group of metrics presented is counts of papers published by different entities. These metrics can be viewed as output and productivity measures. They are not direct measures of research quality, although there is some threshold quality level inferred, since these papers are published in the (typically) high caliber journals accessed by the SCI.

Aggregate China Bibliometrics

In all previous text mining studies published by the first author's group, bibliometrics were performed on the overall database retrieved. Since all these previous studies focused on essentially one technology, the resultant bibliometrics provided the technical infrastructure for that technology. In the present study, the focus is on the wide range of technologies being developed within China. In this section, approximately 35,000 records were downloaded from 2004 to early 2005.

Prolific Journals

The top twenty journals based on number of papers are listed below in Table ES1. The first column is the full journal name, the second column is the number of papers in the journal from the database, the third column is the journal's Impact Factor (the Impact Factor is the ratio of cites of recent articles to numbers of recent articles, and can be

considered one measure of a journal's ability to attract citations), and the fourth column is the journal's theme. The latter two columns will be discussed in the section on Most Cited Journals. These journals appear to be concentrated in chemistry, materials, and physics, with one journal about medicine. Many are Chinese journals.

Table ES1. Most Prolific Chinese Journals – 2004-2005

JOURNAL	#PAPERS	IMP FACT	THEME
Acta Physica Sinica	556	1.25	PHYS
PRICM 5: The Fifth Pacific Rim Int'l Conf On Advanced Mat'ls And Processing, Pts 1-	520		MATLS
Chinese Physics Letters	447	1.18	PHYS
Acta Crystallographica Section E-Structure Reports Online	443	0.49	MATLS
High-Performance Ceramics III, Pts 1 And 2	397		MATLS
Chemical Journal Of Chinese Universities-Chinese	338	0.76	CHEM
Spectroscopy And Spectral Analysis	307	0.35	PHYS
Chinese Journal Of Analytical Chemistry	265	0.41	CHEM
Chinese Physics	264	1.56	PHYS
Rare Metal Materials And Engineering	253	0.44	MATLS
Acta Chimica Sinica	253	0.9	MATLS
Materials Letters	242	1.19	MATLS
Chinese Science Bulletin	241	0.68	SCIENCE
Journal Of Rare Earths	237	0.49	MATLS
Chinese Chemical Letters	229	0.31	CHEM
Applied Physics Letters	219	4.31	PHYS
Transactions Of Nonferrous Metals Society Of China	204	0.28	MATLS
Chinese Medical Journal	201	0.46	MED
Communications In Theoretical Physics	195	0.87	PHYS
Physics Letters A	194	1.45	PHYS

Prolific Institutions

The top twenty institutions are listed below in Table ES2. The dominant institution is the Chinese Academy of Sciences, and the other nineteen institutions are universities.

Table ES2. Most Prolific Chinese Institutions – 2004-2005

INSTITUTION	# PAPERS
Chinese Acad Sci	7029
Tsing Hua Univ	1886
Zhejiang Univ	1477
Peking Univ	1391
Shanghai Jiao Tong Univ	1204
Univ Hong Kong	1098
Univ Sci & Technol China	943
Nanjing Univ	940
Fudan Univ	905
Chinese Univ Hong Kong	880
Hong Kong Polytech Univ	794

City Univ Hong Kong	683
Shandong Univ	672
Jilin Univ	650
Hong Kong Univ Sci & Technol	591
Huazhong Univ Sci & Technol	591
Harbin Inst Technol	590
Nankai Univ	581
Wuhan Univ	562
Xian Jiaotong Univ	533

Collaborative Countries

In November 2005, the SCI was accessed to identify the main collaborating countries with China on research articles, in the period 2004-2005. The results are as follows. The format is the name of the country, followed by the number of articles that contained at least one country author and one Chinese author.

> China (118659); USA (9919); Japan (4247); Germany (2450); England (2295); Canada (1923); Australia (1811); France (1374); Singapore (1334); South Korea (1197); Taiwan (870); Russia (651); Italy (632); Sweden (626); India (623).

What is the citation impact of collaboration? Two cases were compared. The first case consisted of all research articles in the SCI published from 1995-1999 having at least one author with a Peoples Republic of China address. The second case consisted of all research articles in the SCI published from 1995-1999, retrieved using the following address query that essentially generates Chinese-only authored articles: (PEOPLES R CHINA NOT (USA OR JAPAN OR GERMANY OR HONG KONG OR (ENGLAND NOT NEW ENGLAND) OR CANADA OR ITALY OR FRANCE OR AUSTRALIA OR SOUTH KOREA OR TAIWAN OR NETHERLANDS OR SWEDEN OR RUSSIA OR INDIA OR SINGAPORE OR SWITZERLAND OR SPAIN OR BRAZIL OR SCOTLAND OR FINLAND OR MALAYSIA OR ROMANIA OR AUSTRIA)). These countries were the main research collaborators with China in the 1995-1999 time frame.

The first case (China and collaborators) produced the following results:

- Articles retrieved, 83689;
- Median citations of total articles retrieved, 2;
- Median citations of top ten cited articles retrieved, 604;
- Median citations of top 5% articles retrieved, 35.

The second case (China only) produced the following results:

- Articles retrieved, 62018;
- Median citations of total articles retrieved, 2;
- Median citations of top ten cited articles retrieved, 239;
- Median citations of top 5% articles retrieved, 25.

Thus, approximately one-quarter of research articles having at least one author with a China address were the result of China's collaboration with other countries. The impact of collaboration was negligible on median citations of the total. The impact of collaboration was substantial on the top ten cited articles, and was noticeable on the top 5% of cited articles.

What are the main technical areas of collaboration? Two examples will be presented, for the USA and Japan. The 2000 most recent articles for USA-China papers and for Japan-China papers were downloaded from the SCI. A phrase frequency analysis of the Abstracts was performed for each country combination, and the highest frequency high technical content phrases were extracted. The results are as follows.

1) **China-USA**

Single Words
Cells; Expression; Cell; Protein; Gene; Patients; Human; Cancer; Genes; Soil; Treatment; Species; Mice; Disease; DNA; Proteins; Genetic; Receptor; Tumor

Double Word Phrases
Cell Lines; Lung Cancer; Gene Expression; Electron Microscopy; Amino Acid; Cancer Cells; Cell Line; Growth Factor; Transmission Electron; Neural Network; Breast Cancer; X-Ray Diffraction; Cell Death; Increased Risk; Amino Acids; Nasopharyngeal Carcinoma; Prostate Cancer; Ovarian Cancer; Protein Expression; Risk Factors; Cancer Cell; Western Blot; Endothelial Cells; Mass Spectrometry; Neural Networks; Transcription Factor; Blood Pressure; Scanning Electron; Cancer Risk; Cell Growth; Dorsal Horn; Polymerase Chain; Cell Surface; Coronary Artery; Spinal Cord; Tibetan Plateau; Flow Cytometry; Myocardial Infarction

Triple Word Phrases
Transmission Electron Microscopy; South China Sea; Density Functional Theory; Scanning Electron Microscopy; Polymerase Chain Reaction; Risk Of Lung; MRNA And Protein; Cancer Cell Lines; Cells In Vitro; Central Nervous System; Differential Scanning Calorimetry; Enzyme-Linked Immunosorbent Assay; Severe Acute Respiratory; Squamous Cell Carcinoma; X-Ray Photoelectron Spectroscopy; Acute Respiratory Syndrome; Basic Fibroblast Growth; Breast Cancer Cells; Dorsal Horn Projection; Respiratory Syndrome SARS; Small Interfering RNA; Tumor Necrosis Factor; Atomic Force Microscopy

2) **China-Japan**

Single Words

Cells; Cell; Expression; Patients; Protein; Gene; Films; Particles; Treatment; Film; Soil; Human; Cancer; Mice; Tumor

Double Word Phrases

Cell Lines; X-Ray Diffraction; Magnetic Field; Electron Microscopy; Thermal Conductivity; Scanning Electron; Amino Acid; Cell Line; Gene Expression; Particle Size; Amino Acids; Thin Films; Cell Death; Epithelial Cells; Mrna Expression; Transmission Electron; Growth Factor; Neural Network; Photocatalytic Activity; Dose-Dependent Manner; Prostate Cancer; Breast Cancer; Carbon Nanotubes; Fracture Toughness; Grain Size; Heat Transfer; Atomic Force; Electron Microscope; Film Thickness; Soil Moisture

Triple Word Phrases

Scanning Electron Microscopy; Transmission Electron Microscopy; Polymerase Chain Reaction; X-Ray Diffraction XRD; Differential Scanning Calorimetry; Lattice Thermal Conductivity; Atomic Force Microscopy; East China Sea; X-Ray Photoelectron Spectroscopy; Amino Acid Sequence; Anaerobic Sludge Digester; Density Functional Theory; Green Fluorescence Protein; Chemical Vapor Deposition; Endothelial Growth Factor; Enzyme-Linked Immunosorbent Assay

Representative phrases are selected, and the phrases are ordered by frequency of occurrence. The two areas that stand out for both collaborative groups (China-USA; China-Japan) are biomedical and nanotechnology. However, when frequencies of similar phrases from each group are taken into account, for the China-USA articles, biomedical comes first and nanotechnology second. For the China-Japan articles, nanotechnology ranks higher relative to biomedical. Given China's relative (to the USA) investment strategy emphasis in nanotechnology, as will be shown later, and lesser relative investment emphasis in biomedical, *the collaborative research relationship with Japan appears to be more quid pro quo than is the relationship with the USA.*

Citation Statistics on Journals

The second group of metrics presented is counts of citations to papers published by different entities. While citations are ordinarily used as impact or quality metrics (Garfield, 1985), much caution needs to be exercised in their frequency count interpretation, since there are numerous reasons why authors cite or do not cite particular papers (Kostoff, 1998b; MacRoberts and MacRoberts, 1996).

The citations in all the retrieved 2002 SCI papers were aggregated. The journals cited most frequently were identified, and were presented in order of decreasing frequency.

Most Cited Journals

Approximately 2000 journals were cited 10 or more times. The top twenty most cited journals are listed below in Table ES3. The most cited journals appear to be primarily English Language journals in contrast to many of the most prolific journals being Chinese Journals. This suggests that in the 2005 time frame there may be a larger

dependence on English Language (i.e. foreign) journals than on China's own internal journals, at least for Chinese papers published in journals accessed by the SCI.

Table ES3 Most Cited Journals

JOURNAL	#PAPERS	IMP FACT	THEME
Phys Rev Lett	2592	7.22	PHYS
J Am Chem Soc	2196	6.9	CHEM
Nature	2191	32.18	SCIENCE
Phys Rev B	2027	3.08	PHYS
Science	1995	31.86	SCIENCE
Appl Phys Lett	1737	4.31	PHYS
J Appl Phys	1433	2.26	PHYS
J Chem Phys	1174	3.11	CHEM
P Natl Acad Sci USA	976	10.45	SCIENCE
Anal Chem	924	5.45	CHEM
J Biol Chem	917	6.36	BIOL
Phys Rev D	834	5.16	PHYS
Phys Rev A	779	2.9	PHYS
Inorg Chem	757	3.45	CHEM
J Phys Chem-US	738		PHYS
J Am Ceram Soc	738	1.71	MATLS
Macromolecules	714	3.9	CHEM
Angew Chem Int Edit	687	9.16	CHEM
Astrophys J	641	6.24	PHYS
J Org Chem	612	3.46	CHEM

The median Impact Factor of nineteen of the twenty journals listed in Table ES3 (one journal did not have an Impact Factor listed) is **5.45**. This is contrasted with the median Impact Factor of eighteen of the twenty journals containing the most papers and listed in Table ES1 **(0.72)**. This order of magnitude difference in Impact Factor between the journals in which the Chinese researchers publish and the journals that they reference indicates Chinese researchers may not be publishing in the highest research impact journals. Since Impact Factor is discipline dependent, a discipline-based comparison of Tables ES1 and ES3 may be instructive.

The median of the Impact Factors of the seven physics journals in ES1 is 1.25, whereas the median of the Impact Factors of the seven physics journals in ES3 is 4.31, a factor of ~3.5 difference. The median of the Impact Factors of the three chemistry journals is ES1 is 0.41, whereas the median of the Impact Factors of the seven chemistry journals in ES3 is 3.46, a factor of nine difference. The median of the Impact Factors of the six materials journals in ES1 is 0.49, whereas the Impact Factor of the one materials journal in ES3 is 1.71, a factor of ~3.5 difference. The one general science journal in ES1 has an Impact Factor of 0.68, whereas the three general science journals in ES3 have a median Impact Factor of 31.86, a factor of more than forty difference. The one medical journal in ES1 has an Impact Factor of 0.46, while the one biology journal in ES3 has an Impact Factor of 6.36.

While these comparisons are for the top twenty journals only, and the Impact Factors have not been weighted by the numbers of papers in each journal, it is quite clear that, on average, the Chinese researchers are not publishing extensively in the high research impact journals they are referencing. This issue will be examined further in the nanotechnology bibliometrics section, from another perspective.

Selected Topical Bibliometrics

The approach in this section is to identify the thematic thrust areas from the clustering described later, then retrieve documents that address each theme. The bibliometrics will then be performed on a theme by theme basis. For the present study, one theme is selected as an illustrative example for the bibliometrics in the main body of the text, and three other themes' bibliometrics are shown in Appendix 1.

Based on the computational linguistics (clustering) results, nanotechnology is a thrust area of Chinese research. Starting with the words generated by the clustering algorithm for the nanotechnology cluster, an iterative feedback approach was used to generate the following comprehensive query for this research in China:

NANOPARTICLE* OR NANOTUB* OR NANOSTRUCTURE* OR NANOCOMPOSITE* OR NANOWIRE* OR NANOCRYSTAL* OR NANOFIBER* OR NANOFIBRE* OR NANOSPHERE* OR NANOROD* OR NANOTECHNOLOG* OR NANOCLUSTER* OR NANOCAPSULE* OR NANOMATERIAL* OR NANOFABRICAT* OR NANOPOR* OR NANOPARTICULATE* OR NANOPHASE OR NANOPOWDER* OR NANOLITHOGRAPHY OR NANO-PARTICLE* OR NANODEVICE* OR NANODOT* OR NANOINDENT* OR NANOLAYER* OR NANOSCIENCE OR NANOSIZE* OR NANOSCALE* OR ((NM OR NANOMETER* OR NANOMETRE*) AND (SURFACE* OR FILM* OR GRAIN* OR POWDER* OR SILICON OR DEPOSITION OR LAYER* OR DEVICE* OR CLUSTER* OR CRYSTAL* OR MATERIAL* OR ATOMIC FORCE MICROSCOP* OR TRANSMISSION ELECTRON MICROSCOP* OR SCANNING TUNNELING MICROSCOP*)) OR QUANTUM DOT* OR QUANTUM WIRE* OR ((SELF-ASSEMBL* OR SELF-ORGANIZ*) AND (MONOLAYER* OR FILM* OR NANO* OR QUANTUM* OR LAYER* OR MULTILAYER* OR ARRAY*)) OR NANOELECTROSPRAY* OR COULOMB BLOCKADE* OR MOLECULAR WIRE*.

The query was inserted into the Science Citation Index, and the most recent 4030 records were recovered for the period 2003-early 2005. The bibliometrics analysis was performed on these records.

Most Prolific Nanotechnology Authors

Table ES4 – Prolific Authors

AUTHOR	# PAPERS
Li--Y	61
Liu--Y	56
Wang--J	56
Zhang--Y	54
Wang--Y	53
Qian--YT	50
Zhang--J	49

Wang--X	42
Xu--J	41
Wang--L	38
Li--J	36
Zhang--L	36
Gao--L	35
Wang--H	34
Zhang--LD	28
Chen--J	27
Liu--ZM	27
Yang--Y	26
Chen--Y	25
Huang--Y	25

Table ES4 contains the most prolific nanotechnology authors. The results illustrate potential problems with author bibliometrics in countries like China (and India). The names are short, common, and many do not have middle initials. There could be multiple authors with the same name.

Journals Containing Most Papers

Table ES5 – Journals Containing Most Nanotechnology Papers

JOURNAL	# PAPERS
Journal Of Physical Chemistry B	125
Applied Physics Letters	124
Materials Letters	120
Chinese Journal Of Inorganic Chemistry	113
Journal Of Crystal Growth	88
Rare Metal Materials And Engineering	75
High-Performance Ceramics IIIPts 1 And 2	73
Acta Physica Sinica	73
Chemistry Letters	70
Acta Chimica Sinica	64
Physical Review B	62
Thin Solid Films	59
Materials Chemistry And Physics	56
Chemical Journal Of Chinese Universities-Chinese	53
Journal Of Inorganic Materials	52
Chinese Physics Letters	52
PRICMThe Fifth Pacific Rim International Conference On Advanced Materials And Processing, Pts 1-	51
Journal Of Solid State Chemistry	48
Colloids And Surfaces A-Physicochemical And Engineering Aspects	45
Applied Physics A-Materials Science & Processing	45

TABLE ES5 lists the 20 journals containing the most Nanotechnology papers. There seems to be an even mix of both applied and basic journals. Physics, Chemistry, and Materials journals dominate the list. Approximately 25% of the journals are Chinese.

To compare Impact Factors of journals in which Chinese authors publish nanotechnology papers with Impact Factors of journals in which USA authors publish nanotechnology papers, a separate retrieval was made in mid-January 2006. The most recent 2000 articles that had at least one Chinese author but no authors from Japan, USA, Germany, France, South Korea, England, Russia, Italy, India, Spain, Taiwan, or Canada were retrieved, as were the most recent 2000 articles that had at least one USA author but no authors from Japan, China, Germany, France, South Korea, England, Russia, Italy, India, Spain, Taiwan, or Canada. The countries excluded are the major producers of nanotechnology research articles (Kostoff et al, 2006a). The purpose of this comparison is to identify Impact Factors of essentially intranational nanotechnology papers.

Table ES5-USA lists the eleven journals containing the most nanotechnology papers with USA authors, whereas Table ES5-PRC lists the eleven journals containing the most nanotechnology papers with Chinese authors. The median Impact Factor of the USA journals is 3.9, whereas the median Impact Factor of the Chinese journals is 1.19, a difference of more than a factor of three.

Table ES5-USA – Journals Containing Most Nanotechnology Papers – USA Authors

JOURNAL	#PAPERS	IMP FACT
Applied Physics Letters	130	4.31
Physical Review B	102	3.08
Journal Of The American Chemical Society	86	6.9
Langmuir	85	3.3
Journal Of Physical Chemistry B	84	3.83
Nano Letters	52	8.45
Chemistry Of Materials	42	4.1
Journal Of Applied Physics	42	2.26
Physical Review Letters	41	7.22
Nanotechnology	36	3.32
Macromolecules	33	3.9

Table ES5-PRC – Journals Containing Most Nanotechnology Papers – PRC Authors

JOURNAL	#PAPERS	IMP FACT
Rare Metal Materials And Engineering	112	0.44
Materials Letters	76	1.19
Journal Of Physical Chemistry B	63	3.83
Chinese Journal Of Inorganic Chemistry	60	0.6
Nanotechnology	60	3.32

Applied Physics Letters	56	4.31
Chemical Journal Of Chinese Universities-Chinese	41	0.76
Journal Of Crystal Growth	37	1.7
Chinese Physics Letters	33	1.18
Acta Physica Sinica	30	1.25
Acta Chimica Sinica	27	0.9

All the Impact Factor comparisons lead to one inescapable conclusion. The Chinese research article authors are not publishing (on average) in the high research impact journals that they reference, or in which the USA research article authors publish (on average). It is not clear whether the Chinese articles are too applied for the high Impact Factor journals, are of insufficient quality for these journals, or have other reasons.

<u>Most Prolific Institutions</u>

Table ES6 – Most Prolific Nanotechnology Institutions

INSTITUTION	# PAPERS
Chinese Acad Sci	1063
Tsing Hua Univ	260
Univ Sci & Technol China	203
Nanjing Univ	185
Zhejiang Univ	184
Peking Univ	160
Jilin Univ	125
Fudan Univ	117
Shanghai Jiao Tong Univ	108
Shandong Univ	102
City Univ Hong Kong	78
Wuhan Univ	70
Nankai Univ	68
Hong Kong Univ Sci & Technol	66
Tianjin Univ	65
Harbin Inst Technol	65
Xian Jiaotong Univ	62
Hunan Univ	62
Beijing Univ Chem Technol	54
Hong Kong Polytech Univ	49

The 20 most prolific institutions are listed in Table ES6. The first institution, the Chinese Academy of Science, dominates the list. Eighteen of the institutions are universities, and the remaining two are research institutions.

<u>Most Prolific (collaborative) Countries</u>

Table ES7 – Most Prolific Nanotechnology Collaborating Countries

COUNTRY	# PAPERS

Peoples R China	4030
USA	187
Japan	95
Germany	54
Singapore	49
Australia	35
France	30
South Korea	29
England	27
Taiwan	23
Canada	22
Sweden	12
Spain	9
Russia	8
Belgium	6
India	6
Israel	6
Italy	6
Denmark	4
Malaysia	3

The USA is the dominant collaborator, followed by Japan, and by a third tier of Germany and Singapore.

How does collaboration impact the quality of the joint papers in nanotechnology. The following short analysis was performed to address this question. Three classes of nanotechnology research articles from the SCI were selected, published in 1999: 1) those with at least one China-based author, but no USA-based author; 2) those with at least one USA-based author, but no China-based author; 3) those with at least one USA-based author and one China-based author. The following results were obtained (first number is total records retrieved; second number is median citations of total records retrieved; third number is median citations of top ten records; fourth number is median citations of top 5% of records):

1) CHINA NOT USA (1375; 4; 118; 52)
2) USA NOT CHINA (4142; 12; 537; 124)
3) USA AND CHINA (63; 10; 48; 101)

Interestingly, the ratios of the median of the top 5% parallel rather closely the ratios of the overall medians. In the USA-China collaborative group, the numbers are small. There are three articles in the top 5% of the 63 collaborative articles. They have citations of 514, 101, 76, respectively. The next three articles' citations are 49, 48, 48. For the USA-only articles, there are six articles with citations greater than the most-cited collaborative article. For the China-only articles, there is only one article with citations greater than the most-cited collaborative article. This article has five authors with Hong Kong and England addresses; two of the authors have Chinese names, and the other three have Anglo names. This phenomenon was often found in the later section of this report,

when comparing China's citations in selected research areas to those of India. The most cited papers in China or India tended to have some co-authorship with the more advanced countries.

Citation Statistics on Authors, Journals, and Documents

Most Cited First Authors

Table ES8 – Most Cited Nanotechnology First Authors

AUTHOR	#CITES
Iijima S	297
Wang J	194
Pan ZW	159
Huang MH	156
Sun YG	152
Xia YN	140
Caruso F	133
Wang ZL	126
Sheldrick GM	118
Zhang J	117
Duan XF	115
Wang X	112
Alivisatos AP	105
Wang Y	97
Hu JQ	96
Hu JT	93
Cui Y	92
Chen J	87
Decher G	87
Liu Y	84

The presence of Wang-J, Wang-Y, Wang-X, Zhang-J, and Chen-J can be correlated with their appearance as first authors in the most cited documents list.

Most Cited Journals

TABLE ES9 – Most Cited Journals

JOURNAL	# CITES
Appl Phys Lett	4217
J Am Chem Soc	3665
Science	3314
Phys Rev B	2786
Adv Mater	2506
Nature	2397
Chem Mater	2363
J Phys Chem B	2165

Langmuir	2084
Phys Rev Lett	1891
J Appl Phys	1810
Macromolecules	1467
Chem Phys Lett	1407
Angew Chem Int Edit	1258
Polymer	866
Anal Chem	853
J Mater Chem	850
Thin Solid Films	843
J Phys Chem-US	830
J Chem Phys	808

The focus is on physics and chemistry, with reasonable representation from materials journals. The physics journals are a mixture of basic and applied, while the chemistry and materials journals are at the more basic end of the spectrum. There are four journals in common with those in Table ES5 (Applied Physics Letters, Physical Review B, Journal of Physical Chemistry B, Thin Solid Films). None of the most cited journals are Chinese, and the most cited journals in aggregate are more fundamental than those in Table ES5.

Table ES9 represents journals most cited by Chinese nanotechnology researchers. To place these numbers in perspective, an analysis was done to identify the journals cited by all nanotechnology researchers globally, emphasizing obvious Chinese journals. A study of the 2003 global nanotechnology literature retrieved over 21000 articles on nanotechnology (Kostoff et al, 2006a). Over 31000 journals were referenced in these articles. The top 23 journals, and the number of times they were cited, are shown in the top section of Table ES9-CH. The referenced journals with obvious Chinese names (CHIN* or SINICA, in journal name) follow in the bottom section of Table ES9-CH.

There were 206 Chinese journals listed for the above extraction criteria. Most had one or two citations. Only those Chinese journals with ten or more citations are shown. There are a handful of Chinese journals that appear significant, and even these have two orders of magnitude less citations than the leading international journals. Even though China's research article productivity was second to that of the USA (Kostoff et al, 2006a), most of its domestic journals containing these nanotechnology papers were receiving relatively negligible numbers of citations.

Table ES9-CH – Most Cited Journals by Global Nanotechnology Community

ALL JOURNALS	***#CITES***
Phys Rev B	27936
Appl Phys Lett	27281
Phys Rev Lett	20000
J Am Chem Soc	17127
Science	16154
J Appl Phys	13620

Nature	13429
Langmuir	13280
J Phys Chem B	10038
Chem Mater	8415
J Chem Phys	7956
Macromolecules	7683
Adv Mater	7623
J Phys Chem-Us	6188
Chem Phys Lett	6133
Thin Solid Films	4804
Angew Chem Int Edit	4537
J Electrochem Soc	4501
Surf Sci	4024
Anal Chem	3608
Inorg Chem	3188
J Am Ceram Soc	3141
J Mater Res	3000
CHINESE JOURNALS	***# CITES***
Chem J Chinese U	433
Chinese Phys Lett	256
Acta Chim Sinica	145
Chinese Sci Bull	95
Chin J Inorg Chem	85
Acta Phys Sinica	61
Chinese J Chem	47
Chinese Phys	42
Sci China Ser B	40
Chinese J Polym Sci	40
Chinese Chem Lett	38
Chin J Lumin	30
Chinese J Org Chem	28
Chinese J Catal+	24
Chinese J Anal Chem	23
J Chin Chem Soc-Taip	20
Chin J Struct Chem	17
Sci China Ser A	16
Chinese J Appl Chem	16
Chem Res Chinese U	16
Chinese J Inorg Chem	15
Acta Opt Sinica	15
Chin J Mat Res	13
Chin J Appl Chem	11
Chinese J Struc Chem	10

Most Cited Documents

Table ES10 – Most Cited Documents

DOCUMENT	TIMES	TOTAL

	CITED	SCI
Pan ZW, 2001, Science, V291, P1947	125	861
Nanobelts Of Semiconducting Oxides		
Iijima S, 1991, Nature, V354, P56	121	4666
Helical Microtubules Of Graphitic Carbon		
Huang MH, 2001, Science, V292, P1897	102	944
Room-Temperature Ultraviolet Nanowire Nanolasers		
Xia YN, 2003, Adv Mater, V15, P353	91	556
One-Dimensional Nanostructures: Synthesis, Characterization, And Applications		
Morales AM, 1998, Science, V279, P208	77	1007
A Laser Ablation Method For The Synthesis Of Crystalline Semiconductor Nanowires		
Hu JT, 1999, Accounts Chem Res, V32, P435	76	679
Chemistry And Physics In One Dimension: Synthesis And Properties Of Nanowires And Nanotubes		
Alivisatos AP, 1996, Science, V271, P933	74	1943
Semiconductor Clusters, Nanocrystals, And Quantum Dots		
Hoffmann MR, 1995, Chem Rev, V95, P69	53	2080
Environmental Applications Of Semiconductor Photocatalysis		
Sun YG, 2002, Science, V298, P2176	43	289
Shape-Controlled Synthesis Of Gold And Silver Nanoparticles		
Martin CR, 1994, Science, V266, P1961	41	1071
Nanomaterials - A Membrane-Based Synthetic Approach		
Decher G, 1997, Science, V277, P1232	41	1645
Fuzzy Nanoassemblies: Toward Layered Polymeric Multicomposites		
Kresge CT, 1992, Nature, V359, P710	41	4536
Ordered Mesoporous Molecular-Sieves Synthesized By A Liquid-Crystal Template Mechanism		
Peng XG, 2000, Nature, V404, P59	40	603
Shape Control Of Cdse Nanocrystals		
Huang Mh, 2001, Adv Mater, V13, P113	35	442
Catalytic Growth Of Zinc Oxide Nanowires By Vapor Transport		
Vanheusden K, 1996, J Appl Phys, V79, P7983	34	416
Mechanisms Behind Green Photoluminescence In Zno Phosphor Powders		
Oliver WC, 1992, J Mater Res, V7, P1564	34	2366
An Improved Technique For Determining Hardness And Elastic-Modulus Using Load And Displacement Sensing Indentation Experiments		
Han WQ, 1997, Science, V277, P1287	34	585
Synthesis Of Gallium Nitride Nanorods Through A Carbon Nanotube-Confined Reaction		
Treacy MMJ, 1996, Nature, V381, P678	32	835
Exceptionally High Young's Modulus Observed For Individual Carbon Nanotubes		
Murray CB, 1993, J Am Chem Soc, V115, P8706	32	1617

Synthesis And Characterization Of Nearly Monodisperse Cde (E = S, Se, Te) Semiconductor Nanocrystallites	[redacted]

In Table ES10, the full or abbreviated document title is in '**bold'**, following each citation. Two citation numbers are listed for each document. The first (TimesCited) is the citations from the retrieved papers only. These can be viewed as Nanotechnology-specific citations. The second (Total SCI) is the total citations received by the paper as listed in the SCI. The latter cover all succeeding years from the document publication date, and all disciplines.

Essentially, all the most cited nanotechnology documents were published in the last decade. Most of these documents focus on specific material geometries, nanostructure synthesis, specific applications, and methods for evaluating engineering material properties. The fundamental documents on electronic properties, computational approaches, and crystal structure, identified in a broader study of nanotechnology seminal papers (Kostoff et al, 2006a) do not appear in the above list of China's nanotechnology most cited documents. The present references reflect nanotechnology, as opposed to nanoscience, and are in line with the impression of the very applied nature of Chinese research overall. The emphasis on methods for the synthesis of nanostructures shows that there is significant interest in developing the materials and structures to move into manufacturing and products.

Citation Comparison with India and Australia

It was desired to compare China's research with that of at least one other country. India was chosen as a country with many similar characteristics to China (large population, rapidly developing economy, rapid growth in research, etc), and was used as one basis for comparison. This comparison was published in a text mining study on India, and is reproduced here. Australia was chosen as a country located in a similar geographical region (Western Pacific), more developed nation, much smaller population, similar research output for 1998, and was used as a second basis for comparison.

Some background discussion is required to introduce the comparison approach. In evaluating research impact, there are three main criteria to consider: 'right job', 'job right', 'productivity/ progress'. 'Right job' refers to proper selection of the broadest objectives; i.e., is the right study being pursued? Addressing this metric tends to require evaluation of a country's overall investment strategy. "Job right' refers to selection of the best approaches to solving the problem to reach the desired goal. 'Productivity/ progress' refer to whether anything tangible is being accomplished.

A detailed determination of 'right job' using citation statistics would require clustering the vintage papers thematically, examining citation ranges for each cluster (theme), then assuming that those themes that had the highest citations were the 'hot' research areas. The papers that were in the 'hot' clusters would get high ratings for the 'right job' criterion. The 'job right' rating for any of the papers would be determined by its citation position within any of the clusters. However, for this China-India-Australia country

application of the new comparison approach, the first two criteria are combined, and the overall citation statistics for a number of competitive research disciplines will be compared for the two countries.

For the present comparison, 1998 was chosen as the vintage year. It was of sufficient vintage that a substantial number of citations could have had time to accumulate, but sufficiently recent to relate to current research quality. Additionally, the total SCI papers for each country for 1998 were of relatively similar magnitude (India, 16228 research articles; Australia, 20185 research articles; China, 18830 research articles). Equal numbers of records for India, China, and Australia (3500) were downloaded from the SCI. Phrases and their frequencies were extracted from each country's download. China's and India's phrases were combined for the India study, and China's and Australia's phrases were combined separately for the present study. Identical phrases were grouped, and their ratios of frequencies were computed.

It was desired to select phrases representing important technical disciplines with similar levels of emphasis, and since the total published records for each country for 1998 in SCI were within about ten percent, a factor of about two difference in phrase frequency for a technical discipline was viewed as the outer bound of similar emphasis. Thus, those phrases with both high frequencies of occurrence and frequency ratios within a factor of two were extracted, and examined.

For the China-India comparison, different phrases were chosen to represent the four major research categories: Physical Sciences, Environmental/ Agricultural Sciences, Life Sciences, and Materials Sciences. Ordinarily, Engineering Sciences is used rather than Materials Sciences, but there were insufficient phrases with adequate frequencies to represent Engineering Sciences, so Materials Sciences was used instead.

For the China-Australia comparison, different phrases were chosen to represent the four major research categories: Physical Sciences, Environmental/ Agricultural Sciences, Life Sciences, and Engineering Sciences.

Each phrase could be perceived as representing a specific technical discipline within one of the four broader categories defined above. Each phrase was used as a query, and inserted in the SCI search engine for 1998. The total SCI citations for the retrieved records for each country for each phrase from 1998-mid 2005 were tabulated and analyzed. The results for the China-India comparison are shown in Table ES11, and the results for the China-Australia comparison are shown on Table ES12.

Table ES11 –China-India Citation Comparison

TOPIC 1998 RECORDS	INDIA RECORDS RETRIEVED	INDIA CITES TOP TEN-MED	CHINA RECORDS RETRIEVED	CHINA CITES TOP TEN-MED	WINNER
PHYSICAL SCIENCES					

Crystal*	1096	68	1923	96	Chi+
Film*	665	50	1319	58	Chi
Oxidation	555	37	501	47	Chi +
Catalyst Or Catalysis Or Catalytic	468	45	615	67	Chi ++
Algorithm*	322	33	505	36	Even
Nuclear	310	35	365	48	Chi +
Laser*	301	30	680	77	Chi ++
Network*	290	28	434	54	Chi ++
Thermodynamic*	269	43	326	48	Even
Dielectric*	240	25	199	50	Chi ++
Computer*	229	24	336	41	Chi+
Magnetic Field*	211	44	273	33	Ind +
Neutron*	160	41	166	43	Even
Spectromet*	134	20	317	39	Chi ++
Sensor Or Sensors Or Sensing	134	23	244	28	Chi +
Acoustic*	102	13	119	17	Chi
Reaction*	1519	66	1997	97	Chi+
Molecular	871	65	1244	114	Chi++
Chemical*	923	46	1033	64	Chi+
Diffraction	404	42	881	56	Chi+

ENVIRONMENTAL/ AGRICULTURAL SCIENCES					
Soil*	449	24	177	55	Chi ++
Rice	208	17	136	28	Chi ++
Wheat	102	21	206	19	Even
Atmospher*	266	50	250	51	Even
Sea	147	27	153	34	Chi
River*	103	17	103	33	Chi++
Sediment*	171	22	183	43	Chi++
Ocean*	125	32	87	38	Chi
Climat*	122	21	109	52	Chi++
Maize	84	17	49	18	Even

MATERIALS SCIENCES					

Alloy*	359	27	848	47	Chi ++
Composites	161	23	282	35	Chi +
Materials	467	39	618	61	Chi+
Metals Or Metallic	343	49	363	52	Even
Stainless Steel*	79	10	69	16	Chi+
Polymer*	711	44	1023	100	Chi++
Copolymer*	157	18	286	35	Chi++
Ferromagnetic	66	29	111	19	Ind+
Silicon	187	18	411	73	Chi++
Doped	226	43	321	28	Ind+

LIFE SCIENCES					
Enzyme*	650	42	374	70	Chi ++
Gene Or Genes Or Genetic Or Genetics	607	75	815	135	Chi ++
Antibod*	292	32	247	76	Chi ++
Cancer	199	24	257	76	Chi ++
Biolog*	314	32	271	45	Chi+
Protein*	993	105	878	108	Even
Disease*	552	60	357	146	Chi++
Blood	382	40	347	125	Chi++
Liver	253	29	223	52	Chi++
Bacter*	310	30	152	48	Chi+

Before discussing the findings, the philosophy behind Table ES11 will be presented. There are a number of different metrics that could be selected for citation comparisons between the two countries. Average citations, median citations, citation distributions based on the total retrievals or a portion of the retrievals would all be candidates. However, given the nature of research, where many times only a modest fraction of projects will achieve their initial objectives, it is most important to identify those projects that generated substantial payoff. This suggests emphasis on the top layer of performing projects. This layer could be a fixed number (e.g. top ten) or a percentage of the total (e.g., top 1%). The Finland study we are presently conducting used both, and the relative standings remained the same.

Thus, the citation performance of the ten most cited papers for each technology for each country was compared. Initially, both the median citations and the citations of the two highest papers were used as metrics, to obtain multiple perspectives for comparison. However, in many cases the most cited paper was an outlier, and included authors from

other (more technologically advanced) countries (especially in India's case). Since the contribution of the authors from other countries to the quality of the target paper was unknown, it was believe that giving full weight to the outliers' citations to either India or China would distort the results. All the top ten papers were retained for computing the median, reflecting the reality that India or China did play some role in the outliers' quality, and the median of the top ten was the final metric employed.

China-India Comparison Discussion

Now, the findings in Table ES11 will be addressed. The first column in Table ES11 is the query phrase, including variants in some cases. The second column is the number of 1998 India records retrieved for the query phrase, and the fourth column is the number of 1998 China records retrieved for the query phrase. The third column is the median citations of the ten most cited Indian papers, while the fifth column contains the same type of information for China papers. The sixth column is the citation 'winner' in the technical discipline examined, with the pluses (+) denoting the strength of the lead. The patterns of winners in the different broad categories are examined, and judgments about leadership in each of the four major categories are made.

The phrases (technologies) are grouped by major category. The first group is Physical Sciences. Out of twenty phrases examined, representing diverse areas of physical sciences, China was a clear winner in fifteen, India led in one, and four were viewed as even. Clearly, China is the leader in Physical Sciences, based on top ten median numbers of citations.

The second group is Environmental Sciences. Out of ten phrases examined, China was the clear leader in seven, and three were considered even. Clearly, China is the leader in Environmental/ Agricultural Sciences.

The third group is Material Sciences. Out of ten phrases examined, China was the clear leader in seven, India was the clear leader in two, and one was considered even. Clearly, China is the leader in Material Sciences.

The fourth group is Life Sciences. Out of ten phrases examined, China was the clear leader in nine, and one was considered even. Clearly, China is the leader in Life Sciences.

Thus, China was the clear leader in each major category, although there were (isolated) instances where India led in a sub-technology area. It should be re-emphasized that this citation comparison did not examine relative investment strategies. It focused only on technical areas that had similar magnitudes of investment. It should also be emphasized that there can be many reasons why an article receives or does not receive citations (Kostoff, 1998b). These include intrinsic quality, research fundamentality (more fundamental articles receive, on average, more citations), and journal visibility. To identify which of these causation factors is operable, samples of articles would have to be

retrieved, and each article examined in detail. Such an in-depth analysis was beyond the scope of the present study.

China-Australia Comparison

Table ES12 –China-Australia Citation Comparison

TOPIC 1998 RECORDS	AUSTRALIA RECORDS RETRIEVED	AUSTRALIA CITES TEN-MED	CHINA RECORDS RETRIEVED	CHINA CITES TEN-MED	WINNER
PHYSICAL SCIENCES					
Chromatograph*	356	70	365	34	Aus++
Conductivity	120	39	297	33	Aus
Electronic	188	62	505	29	Aus++
Electrophoresis	179	72	169	35	Aus++
Finite Element*	152	28	226	26	Aus
Gravity	92	29	75	23	Aus
Isotope*	177	77	160	45	Aus+
Magnetic Field*	154	39	273	33	Aus
Mechanical	333	66	510	51	Aus+
Microscopy	458	111	726	56	Aus++
Molecular Dynamics	49	42	82	20	Aus++
Nonlinear Or Non-Linear	404	84	769	49	AUS+
Photon*	147	59	186	54	Aus
Polymer	212	58	523	50	Aus
Spectromet*	265	70	317	40	Aus++
Star Or Stars	170	98	97	35	Aus++
Superconduct*	116	32	283	32	Tie
Ligand*	419	208	475	84	Aus++

ENVIRONMENTAL/ AGRICULTURAL SCIENCES					
Climat*	282	99	109	53	Aus++
Earthquake*	18	22	31	9	Aus++
Floral	32	24	14	9	Aus++
Geochemi*	122	56	86	43	Aus+
Irrigation	57	21	17	8	Aus++
Ocean*	282	116	87	38	Aus++
Rock*	394	82	220	68	Aus+
Sea	338	94	153	34	Aus++
Seawater	55	45	24	12	Aus++
Sediment*	383	66	183	44	Aus+
Seedling*	139	38	58	21	Aus++
Tectonic	106	62	59	47	Aus+
Tomato*	41	37	14	14	Aus++
Volcan*	109	55	42	41	Aus+

Wheat	249	57	102	22	Aus++

ENGINEERING SCIENCES					
Aircraft	30	10	20	3	Aus++
Buckling	35	11	45	11	Tie
Engine*	191	50	212	20	Aus++
Heat Treatment	31	17	97	17	Tie
Sinter*	47	23	122	19	Aus
Software	133	61	74	11	Aus++
Steel*	146	30	285	19	Aus+
Wastewater*	32	16	22	11	Aus+
Weld*	41	12	52	9	Aus
Iron	267	88	323	44	Aus++
Metal*	737	102	1359	98	Aus

LIFE SCIENCES					
Antibod*	738	238	247	77	Aus++
Arterial	188	77	55	29	Aus++
Blood	968	181	347	127	Aus+
Cancer*	607	185	270	83	Aus++
Chromosome	253	205	107	52	Aus++
Clone*	272	123	168	71	Aus+
Dna	887	215	538	81	Aus++
Enzyme*	612	238	374	72	Aus++
Gene Or Genes Or Genetic	2001	347	811	137	AUS++
Liver*	352	129	226	52	Aus++
Lymphocyte*	347	191	92	47	Aus++
Peptide*	440	124	192	66	Aus++
Polymerase	319	93	140	73	Aus+
Protein*	1962	329	878	110	Aus++
Tissue*	999	183	370	86	Aus++
Tumor*	411	187	314	75	Aus++

China-Australia Comparison Discussion

Now, the findings in Table ES12 will be addressed. The first column in Table ES12 is the query phrase, including variants in some cases. The second column is the number of 1998 Australia records retrieved for the query phrase, and the fourth column is the number of 1998 China records retrieved for the query phrase. The third column is the median citations of the ten most cited Australian papers, while the fifth column contains the same type of information for China papers. The sixth column is the citation 'winner' in the technical discipline examined, with the pluses (+) denoting the strength of the lead. The patterns of winners in the different broad categories are examined, and judgments about leadership in each of the four major categories are made.

The phrases (technologies) are grouped by major category. The first group is Physical Sciences. Out of eighteen phrases examined, representing diverse areas of Physical Sciences, Australia was a clear winner in eleven, a close winner in six, and tied with China in one. Australia is clearly the leader in Physical Sciences, based on top ten median numbers of citations.

The second group is Environmental/Agricultural Sciences. Out of fifteen phrases examined, Australia was the clear leader in all fifteen. Australia was an obvious winner over China in Environmental/Agricultural Sciences.

The third group is Engineering Sciences. Out of eleven phrases examined, Australia was the clear leader in six, a close leader in three, and was tied with China in two. Although Australia is the winner in Engineering Sciences, China's foucus on engineering and applied sciences can be seen, even compared to a first world country such as Australia.

The fourth group is Life Sciences. Out of sixteen phrases examined, Australia was the clear leader in all sixteen. This result is not only expected, but is further evidence that China is currently putting relatively more research effort into engineering and applied sciences than any other category, especially Life Sciences.

Thus, Australia was the clear leader in each major category, although there were (isolated) instances where China was tied in a sub-technology area. It should be re-emphasized that this comparison did not examine relative investment strategies. It focused only on technical areas that had similar magnitudes of investment.

Taxonomies

The full report contains myriad manual and statistical clustering approaches to generate the technical structure taxonomy for China. In this Executive Summary, only the partitional document clustering approach is presented for SCI articles for 2005.

Document clustering is the grouping of similar documents into thematic categories. Different approaches exist (e.g., Willett, 1988; Rasmussen, 1992; Cutting, 1992; Guha, 1998; Hearst, 1998; Zamir, 1998; Karypis, 1999; Steinbach, 2000). The approach presented in this section is based on a partitional clustering algorithm (Zhao and Karypis, 2005; Karypis, 2005) contained within a software package named CLUTO. Most of CLUTO's clustering algorithms treat the clustering problem as an optimization process that seeks to maximize or minimize a particular clustering criterion function defined either globally or locally over the entire clustering solution space. CLUTO uses a randomized incremental optimization algorithm that is greedy in nature, and has low computational requirements. Appendix 2 describes the partitional clustering approach in more detail.

Document Clustering Results

In partitional clustering, the number of clusters desired is input, and all documents in the database are included in those clusters. Clustering was done for the 2005 documents retrieved from the SCI. There were 256 clusters run for the retrieved articles, and these clusters are listed in detail in Appendix 3, in the order by which they appear on the hierarchical tree. The main keywords from each cluster (and the percentage of the cluster theme for which they account) are shown in parentheses after the number of records in each cluster, in Appendix 3. The keywords are arranged by their contribution to the cluster's theme, in descending order of importance.

Three levels of filtering were used to obtain the main keywords shown in Appendix 3. First, a trivial word list (e.g., of, the, on, etc) was applied to the raw data. Second, only the highest frequency words for each cluster were retained. Third, a manual filtering was performed on the thirty highest words. The themes of each cluster (in brief narrative form) follow the keywords shown. The 256 clusters were aggregated into a hierarchical taxonomy using a hierarchical tree generated by the CLUTO software. The first four levels of the Chinese research taxonomy for 2005 are shown in Figure ES1. The categories in the taxonomy levels, and the number of documents in each category (shown in parentheses after each category narrative), are described as follows.

Figure ES1 – 2005 Chinese Research Taxonomy

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
physical and engineering sciences (19807)	chemical reactions, molecular and atomic structure (5841)	molecular and crystal structure (1813)	atomic bonds and the crystal structure of molecules (1297)
			crystal orientation of molecules/atoms/ visualization (516)
		chemical reactions and behaviors, chemical analysis, liquid chromatography (4028)	catalytic reactions (2270)
			adsorption of chemicals, analysis of chemicals by liquid chromatography (1758)
	Physics, thin	structural and	nanomaterial structure,

	films,alloys, and nanomaterials, the mechanical properties of materials (13966)	mechanical properties of materials, materials analysis (8056)	structural visualization (2830)
			alloys, alloy composition, composition/structure (5226)
		Physics, thin films and optics (5910)	thin films, thin film deposition (1274)
			structure and properties of thin films (thickness, density function, etc) and optics and physics (4636)
life sciences, environmental sciences, and mathmatics (14539)	mathematics, algorithm and program development, modeling (mathematical & algorithmic), system modeling (7162)	mathematics: differential equations, algebraic equations (2333)	differential equations, equations of systems (1287)
			algebraic equations and functions (1046)
		mathematical modeling and genetic algorithms (4829)	system and network modeling, large scale modeling, neural networks (3552)
			genetic algorithems, imaging (1277)
	cellular and genetic biology, health, and geophysics/geology (7377)	genetic and cellular expression (3739)	gene expression, sequencing (1018)
			cellular expression

			(2721)
		chinese geophysics; health research (3638)	chinese medical patients (1837)
			Soils, plants and rare earth elements (1801)

The first major division (first level) in the 2005 taxonomy is physical and engineering sciences (19807) and life sciences and mathematics (14539). While mathematics is applicable to physical, engineering, and life sciences, it typically is categorized with the physical sciences. It appears that the life-sciences based terminology of some branches of mathematics (genetic programming, genetic algorithms, neural networks, etc) resulted in mathematics being assigned by the clustering algorithm to the life sciences category. For purposes of this discussion, mathematics will be treated as part of the physical and engineering sciences category.

The physical and engineering sciences category (with mathematics included) has 3.66 times as many records as life sciences, which shows China's strong emphasis in physical and engineering sciences relative to life sciences The physical and engineering sciences branch further splits into chemistry, physics/ materials, and mathematics ("chemical reactions, chemistry" (5841), "physics, thin films, alloys, and nanomaterials, the mechanical properties of materials" (13966), "mathematics, algorithm and program development, modeling (mathematical & algorithmic), system modeling" (7162)). The "physics, thin films, alloys, and nanomaterials, the mechanical properties of materials" category has almost three times as many records as the "chemical reactions, chemistry" category, and twice the records of the mathematics category. The other main branch of the tree, life sciences and mathmatics, consists only of life sciences ("cellular and genetic biology, health, and geophysics/geology" (7377)) for the present discussion.

The third level of the hierarchy offers further differentiation. The chemistry category divides into a more fundamental structural sub-category ("molecular and crystal structure" (1813)) and a more applied dynamic sub-category ("chemical reactions and behaviors, chemical analysis, liquid chromatography" (4028)), with twice the output in the applied dynamic sub-category, The physics/ materials category divides into a physics sub-category ("physics, thin films and optics" (5910) and a materials sub-category ("structural and mechanical properties of materials, materials analysis" (8056)), The physics sub-category focuses on surface phenomena (e.g., films), and much of the thin film work could be considered as overlapping with the materials category. The materials sub-category focuses on bulk material phenomena, with the exception of the nanomaterials component. Thus, the physics/ materials category has a heavy weighting toward the materials component, with attention paid to both bulk and surface phenomena. The mathematics category divides into a more fundamental mathematical analysis category ("mathematics: differential equations, algebraic equations" (2333)) and a more applied mathematical modeling sub-category ("mathmatical modeling and genetic algorithems" (4829)), with twice the output in the more applied modeling category. The life sciences category divides into a fundamental biology category ("genetic and cellular

expression" (3739)) and a combination of applied clinical medicine and environmental geobiophysics ("Chinese geophysics; health research" (3638)).

The fourth hierarchical level provides further differentiation, and specific topics begin to emerge. To define these sixteen sub-categories more definitively, the following approach was used. Based on the hierarchical tree structure, the elemental clusters (from the 256 total) that fall under each fourth level sub-category are identified, and their themes listed under each fourth-level sub-category in bulletized summary form. The order of presentation is that shown on Figure ES1, starting from the top sub-category of level 4. The one digit prefixes in the following refer to level 1 categories; the two digit prefixes refer to level 2 categories; the three digit prefixes refer to level three categories; and the four digit prefixes refer to level four categories.

Level 4 Descriptions at the Elemental Cluster Level

1. **Physical and Engineering Sciences**

1.1. **chemical reactions, chemistry**

1.1.1 **the structure of molecules, crystal structure (1813)**

1.1.1.1. **atomic bonds and the crystal structure of molecules (1297)**

- *bonds between atoms and molecules, specifically hydrogen bonding, and atom interaction.*
- *compounds containing intramolecular hydrogen bonds, with emphasis on their structure.*
- *compounds and molecules containing rings, such as benzene rings, with emphasis on their synthesis and characterization.*
- *atomic structure of molecules and compounds.*
- *atomic structure concentrating on O2 and N2 atoms, with emphasis on ligands and synthesis of complexes.*
- *chemistry with emphasis on chemical mechanics.*
- *various metal complexes and chemical properties of materials, with emphasis on ligands.*

1.1.1.2 the crystal orientation of molecules/atoms/ visualization (516)

- *single crystal x-ray diffraction method for analyzing compounds and their structure.*
- *characterization of crystal structures, especially space groups.*
- *crystallographic structures and space groups, especially determination of unit cell dimensions: (designated as a, b, and c) in angstroms.*

1.1.2 **chemical reactions, liquid chromatography (4028)**

1.1.2.1. **catalytic reactions (2270)**

- *isolation of compounds and elucidation of their structures.*

- *glucopyranosyl, especially isolation of chemical compounds containing glucopyranosyl.*
- *alpha and beta cyclodextrin.*
- *characteristics of various molecules, such as molecular weight, degradation of the molecules, etc.*
- *structure and characteristics of various molecules, mainly using NMR mass spectrometry.*
- *various chemical compounds and their synthesis.*
- *kinetics of reactions.*
- *various chemical reactions, and the product of those reactions and the conditions needed for the reaction, more specifically reaction temperature.*
- *synthesis of chemicals and chemical reactions.*
- *various chemical reactions and specifically on their yields.*
- *chemical reactions with an emphasis on catalyzing agents.*
- *chiral compounds, chiral ligands and enantioselectivity.*
- *aldehydes, especially aromatic aldehydes, with emphasis on reactions involving them.*
- *ionic liquids, especially BMIM: (butyl methylimidazolium), with emphasis on its use as a reaction medium and promoter to increase reaction yields.*
- *catalysts and their use.*
- *chemical reactions, specifically those involving catalysts.*
- *molecular sieves, especially those comprised of MCMs: (mesoporous crystalline materials), with emphasis on their synthesis and characterization.*
- *zeolites and their formation and chemical makeup, as well as various catalysts.*

1.1.2.2 adsorption of chemicals, and analysis of chemicals by liquid chromatography (1758)

- *adsorption and removal of matter from various media using various adsorption media.*
- *surfactants and micelles and their aggregates.*
- *water, and various chemical reactions/solutions that involve/contain water. Also talks about membranes, and the properties of solutions containing water.*
- *acids and their uses, as well as the degradation of various compounds, either by acids or using other means.*
- *preservation of fruits after harvest and its relation to the concentration of CO2 in the controlled environment.*
- *devices containing or utilizing gold, with emphasis on electrodes, especially self-assembled monolayers: (SAMs), and biosensors.*

- *electrodes in electrochemical systems, especially carbon-based electrodes.*
- *molecular detection, as well as electrode fabrication and use.*
- *chemiluminescence, emphasizing issues of detection limit for detecting trace material amounts, especially at the microgram level of concentration.*
- *chemical separation methods, especially those based on capillary electrophoresis: (CE).*
- *different means of either charge or mass separation, high pressure liquid chromatography, or liquid-liquid extraction*
- *mass spectrometry and liquid chromatography.*
- *compounds and enzymes, with emphasis on their synthesis, separation, and purification, and especially the use of chromatography.*
- *the extraction and recovery of one physical component from another physical component.*

1.2. **thin films and mechanical properties of materials**

1.2.1 **the structural and mechanical properties of materials (8056)**

1.2.1.1. **nanomaterial structure, structural visualization (2830)**

- *polymers, their formulation, their formation, and their uses.*
- *various polymers, copolymers, monomers, and grafting.*
- *polymers, especially block copolymers, with emphasis on their synthesis.*
- *crystal structures of various compounds and their physical properties such as melting properties with the analysis done by differential scanning calorimetry.*
- *blends, especially of polymers, with emphasis on high density polyethylene as well as mechanical and melt properties.*
- *curing and resins, with emphasis on curing of resins.*
- *synthesis of nanocomposites, particularly polymer/clay nanocomposites containing montmorillonite: (MMT).*
- *carbon nanontubes, especially their synthesis and structure*
- *nanotubes, especially synthesis of carbon nanotubes.*
- *single-wall and multi-wall carbon nanotubes; includes studies that focus on their synthesis, characterization, and use in reactions involving other materials.*
- *nanowires, especially their synthesis and characterization.*
- *ZnO, especially ZnO nanorods, with emphasis on their synthesis and structure*
- *nanostructures, especially nanorods and nanobelts, and their formation and characteristics*
- *electron microscopy, especially transmission electron microscopy: (tem).*

- *nanoparticles, especially those containing gold.*
- *colloidal silver spheres and their self assembly.*
- *mesoporous silicas.*
- *separation of materials, pore sizes in filter media and the structure of the filter media itself.*
- *various suspensions, and the nanoparticles in them. Also talks about powders and the particles' surface area.*
- *powders and their fabrication and synthesis and mechanical properties.*
- *particulate matter of varying types, and its size and size distribution.*
- *shells and encapsulating various compounds within them.*
- *TiO2, especially its photocatalytic behavior.*

1.2.1.2 alloys, alloy composition, composition/structure (5226)

- *pressure and high pressure. Sometimes discusses chemical reactions or geologic phenomina.*
- *temperature and associated phenomena.*
- *different phases of materials as well as the effect that phase change has on the material.*
- *magnetic properties of materials along with feromagnets, as well as the doping of various materials to make them magnetic.*
- *magnetic properties of various materials, the effects of magnetization on various materials.*
- *magnets and magnetic fields.*
- *turbulent flow, especially vortex dynamics and modeling.*
- *flow dynamics and fluid flow modeling.*
- *heat transfer.*
- *heat transfer mechanics and applications, as well as heat transfer experiments.*
- *air cooling and heating systems, especially their energy consumption and efficiency.*
- *cracking, crack tip growth rates, and stress intensity factors of materials.*
- *mechanical properties of materials, and stresses on them, along with what happens to stressed materials. Also talks about residual stresses, and stress testing and stresses in rocks.*
- *mechanical properties of materials with emphasis on damage to the material, plastic deformation and fatigue life.*
- *deformation behavior of materials as determined through experimental investigations.*
- *loading of structural members along with their mechanical properties and the failure modes of various beams, laminates and other materials.*
- *finite element models.*

- *martensitic transformation temperatures, particularly of shape memory alloys*
- *Focus on glasses, especially metallic glasses, with emphasis on synthesis and characterization of properties such as glass transition temperature.*
- *characterization of alloys, especially amorphous alloys, with emphasis on high temperature and magnetic properties.*
- *alloy synthesis and electrochemical characterization, with emphasis on characterization of hydrogen storage and discharge capacity.*
- *creation/formation/evaluation of alloys and their microstructure.*
- *coatings, especially composite coatings.*
- *wear resistance of materials, especially experimental evaluation of wear resistance properties.*
- *composition, mechanical properties, and synthesis of various materials.*
- *charge and discharge capacity of various materials, and mainly their use in electrochemical/electrical charge transfers. Basically it batteries/battery cells.*
- *solder and solder joints, particularly lead free solder, with emphasis on solidification, structure, and properties.*
- *structure and properties of materials, with emphasis on characterization of welds and fatigue and fracture behavior.*
- *corrosion and pitting resistance of metals and alloys, including steels and stainless steels.*
- *various steels, especially ferritic and austenitic, with an emphasis on failure modes, testing, and composition*
- *the grain structure of various alloys and the microstructure of such alloys.*
- *various sintering techniques such as spark plasma sintering, and the mechanical properties of sintered materials as well as proper sintering techniques.*
- *ceramics, including fabrication, doping, and mechanical properties.*
- *characterization of the dielectric properties of ceramics.*

1.2.2 **thin films and optics (5910)**

1.2.2.1. **thin films, thin film deposition (1274)**

- *films, especially thin films, with emphasis on their synthesis and evaluation.*
- *thin films and their deposition.*
- *various films, discussing formation, doping, deposition etc.*
- *diamond films, including nano-structured diamond films, with emphasis on their deposition by various methods.*
- *films and doping agents that are embedded or placed on films, such as sensors.*

- *films, specifically composite films and polymer films.*

1.2.2.2 structure and properties of thin films (thickness, density function, etc) and optics and physics (4636)

- *thin films and their substrates, and film deposition.*
- *etched layers, usually of silicon, and includes quantum dots as well.*
- *devices, especially organic light emitting devices, including light emitting diodes: (LEDs), with emphasis on their fabrication.*
- *black holes and black hole event horizons, with emphasis on their associated entropy.*
- *many different aspects of astronomy, including pulsars, gamma ray emission and luminosity.*
- *stars, and their relation to composition and evolution of galaxies.*
- *the emission properties of materials, especially photoluminescence.*
- *Europium ion: (Eu3+ and Eu2+) doped phosphors, especially their synthesis and characterization, with emphasis on luminescent properties.*
- *glasses containing Er3+, especially for upconversion laser applications.*
- *fluorescence of various materials/atoms/compounds and fluorescence quenching.*
- *chitosan, and the separation of various molecules specifically by means of absorption.*
- *photons: (emission/absorption/interaction) and multi-level atomic systems emphasizing the role of fields on the photon and atomic system behaviors.*
- *pulses from optical lasers.*
- *lasers and pumped lasers.*
- *fiber optics and the component fibers.*
- *fibers, especially fibers for composites and concrete reinforcement, with emphasis on their syntheis and characterization.*
- *gratings, especially fiber Bragg gratings: (FBGs), with emphasis on their development as sensors and optical elements.*
- *power, namely electrical power, as well as various switches and power converters.*
- *the resonant frequencies of various excited particles.*
- *antennas, particularly patch antennas, with emphasis on their design and characterization.*
- *waveguides along with Finite Difference Time Domain analysis of the waveguides.*
- *electromagnetic, gravitational, and other waves, and their propagation.*
- *beams, especially Gaussian beams.*

- *optics, both biological: (human eye) and mechanical: (optical crystals etc, with some emphasis on solitons).*
- *spectra of various molecules and how the spectra was obtained, especially ion absorption and laser optics*
- *various crystals and their light carrying/ other optical properties, as well as defects in them.*
- *doped materials, especially crystals and their various parameters that fall in different bands. Also emphasizes optical band gaps.*
- *structure of various molecules and atoms or clusters of atoms. Also discusses the orbit of electrons, and the density and structure based on density functional theory.*
- *bonds between atoms and molecules, with emphasis on their electron transfer.*
- *reactions, especially their energy and transition states.*
- *the energy states of various charged particles.*
- *the states of various systems, and their synchronization and coupling.*
- *various topics in astrophysics, and physics in general.*
- *quantum particules, and quantum dots, and the spin of electrons.*
- *quantum entanglement and entanglement states.*
- *decays of subatomic particles, especially those involving branching fractions.*
- *quarks and quark models.*
- *energy levels in the GeV range; especially energies related to the motion and interaction of sub-atomic particles.*
- *cross sections, especially related to quantum reactions/interactions.*
- *various experiments that probe the nucleus, emphasizing detection of protons and neutrons.*

2. **life sciences and mathematics**

2.1. **mathematics, algorithm and program development, modeling (mathematical & algorithmic)**

2.1.1 **mathematics and differential equations (2333)**

2.1.1.1. **differential equations, equations of systems (1287)**

- *mathematics: boundary conditions, equations, etc.*
- *numerical equations, especially solution of numerical equations for fluid flows, such as the navier stokes equation.*
- *differential equations to describe various systems*
- *mathematics, especially solution techniques for mathematical equations.*
- *exact solutions, including solitary wave solutions, to various equations and functions.*
- *solitons: (waves), especially equations and solutions related to them.*
- *evaluations of systems, especially those involving limit cycles, homoclinic loops or orbits, and oscillation or oscillators.*

- *bifurcation, especially Hopf bifurcation.*
- *positive periodic solutions to system equations.*
- *existence of positive solutions to equations, especially those involving a fixed point theorem.*
- *mathematical equations and mathematical models and systems.*

2.1.1.2 algebraic equations and functions (1046)

- *mathematical investigations, with emphasis on solutions to equations and functions.*
- *graphs and curves, especially theories and proofs involving them*
- *algebras, especially Lie algebra and loop algebra.*
- *system symmetries, especially Lie symmetries and non-Noether conserved quantities.*
- *mathematical theorems.*
- *mathematics, with emphases on spaces and manifolds.*
- *mathematics, with a strong emphasis on matrices.*
- *various functions of finite element models, and the mathematics associated with them.*
- *computer optimization of data sets, along with optimization functions.*

2.1.2 **mathematical modeling and algorithms (4829)**

2.1.2.1. **genetic algorithms, imaging (1277)**

- *algorithm development, especially modeling, convergence, and optimization.*
- *various computer algorithms.*
- *algorithms, especially search algorithms, development for specific problems of interest.*
- *algorithms, with an emphasis on clustering algorithms.*
- *wavelets.*
- *speech, voice, and written or typed character characterization and classification, with emphasis on feature/ word extraction.*
- *face recognition algorithms.*
- *imaging, both the instruments used and the mechanics behind taking images.*

2.1.2.2 **system and network modeling, large scale modeling, neural networks (3552)**

- *video, especially sports video, with emphasis on watermarking.*
- *caching schemes and caches, especially proxy caches, as they relate to media streaming on networks and servers*
- *coding over channels, with emphasis on errors and fading.*
- *estimation, and the error associated with estimation.*

- *filters, especially those designed to reduce noise.*
- *chaotic systems, especially their control and synchronization.*
- *various control systems and the controllers themselves.*
- *mathematically fuzzy concepts, including fuzzy control, fuzzy models, fuzzy logic, etc.*
- *control of linear systems, especially related to time delay and feedback control.*
- *stability of delayed neural networks, particularly cellular neural networks, with emphasis on global exponential stability*
- *neural networks, especially artificial neural networks: (ANNs).*
- *networks, specifically computer networks, and the various nodes in a network.*
- *traffic, mainly on internet and electronic traffic.*
- *signature and signature schemes, including proxy signature schemes, for data encryption*
- *security, especially system and protocol security.*
- *resource management, especially as it relates to computer networks, with emphasis on mobile agents and digital libraries*
- *Grid Computing, a system for computer resource sharing.*
- *web services, especially focused on semantic Web aspects.*
- *systems for storing and sharing data, especially peer to peer (P2P) systems*
- *peer to peer: (P2P) networks and file-sharing systems, with emphasis on their topology and topological mismatches.*
- *economics, specifically different markets, firms, and the price of goods in different economies.*
- *business structure and business modeling and supply chains, including the role of linguistics in the decision support systems.*
- *various construction projects, mainly in china.*
- *the design of new components, systems, and structures.*
- *systems, with minor emphasis on operating systems and software.*
- *machine scheduling and optimization, with emphasis on algorithms that deal with these subjects.*
- *support vector machines.*
- *environmental forcasting and modeling.*
- *data aquisition and system modeling.*
- *models, especially their parametric analyses.*
- *simulations, especially of fluid dynamical systems.*

2.2. gene expression and cellular biology

2.2.1 Chinese geophyics and chinese citizens and their health problems (3638)

2.2.1.1. gene expression, sequencing (1018)

- *isolates and strains of micro-organisms or genes, especially rRNA.*

- *DNA, particularly the immobilization of DNA, and enzymes.*
- *DNA, specifically on detection, characterization, mutation, sequencing.*
- *dna and genomic sequencing.*
- *genes, especially cDNA.*
- *transgenic experiments, especially those involving transgenic plants.*
- *genes, and gene expression and genetic sequencing.*

2.2.1.2 **cellular expression (2721)**

- *various forms of cancer and possible treatments, and cellular expression.*
- *tumors, including tumor growth, metastases, treatment, and inhibition, with emphasis on experiments involving cells in mice or cell lines.*
- *various kinds of cells and their attributes, along with cellular expression.*
- *various kinds of cells, expression of those cells, and gene expression.*
- *multiple types of cells and what affects them, emphasizing apoptosis.*
- *kinase and receptor activation,and the signaling of the cells between the receptors.*
- *various chemicals or molecules/compounds that have an effect on the body (activation or inhibition) or the body's reaction to various stimuli.*
- *calcium ion, Ca+2, particulary as it relates to cells and cellular functions.*
- *neurons.*
- *experiments performed on rats, especially impacts on their brain.*
- *cellular expresson and tumor necrosis factor alpha and transforming growth factor.*
- *use of mice in medical experiments.*
- *antibodies, vaccines, and immunity.*
- *proteins and their characterization and use.*
- *proteins, and protein separation, and protein analysis.*
- *proteins, viruses, antibodies and vaccines related to SARS: (Severe Acute Respiratory Syndrome)*
- *SARS: (Severe Acute Respiratory Syndrome), particularly studies involving SARS patients, cases and outbreaks.*

2.2.2 **genetic expression, and cells, mainly cancer cells (3739)**

2.2.2.1. **Chinese medical patients (1837)**

- *the circulatory system, emphasizing arteries and stents, and clinical problems associated with various patients.*
- *the renal system, and patients who have renal problems and some of their treatments.*

- *medical patients and their medical problems.*
- *medical/ biological experiments, and talks about the different groups in the experiment.*
- *interaction of insects and their predators, and what influences the mortality of insects/fish.*
- *various clinical medical studies, usually involving women.*
- *sexually transmitted diseases such as HIV. Also smoking and its health problems, as well as other respiratory ailments.*
- *health problems among Chineese citizens, especially in Hong Kong.*
- *various social and health characteristics and behaviours of Chinese citizens and children.*
- *Chinese families, with emphasis on genetics and medicine.*
- *cancer risk and control.*
- *specific types of genes, especially polymorphs, and their functions.*
- *genetic diversity in populations.*
- *chromosomes and genes, especially genetic markers and traits.*

2.2.2.2 **Soils, plants and rare earth elements (1801)**

- *rock and mantle beneath North China, with emphasis on isotope dating.*
- *geological formations in China, with emphasis on determination of geologic age.*
- *seismic activity, including earthquakes.*
- *wind, both solar wind and lower atmospheric wind; includes wind modeling, and wind damage, as well as particulates in the wind such as dust and aerosols.*
- *creating climate models,especially over water or near coasts, and various ways to determine moisture concentrations and ways of measuring various quantities that affect climate, such as moisture etc.*
- *climate analysis (especially monsoons) and indoor air pollutant studies, mainly in china and the surrounding areas.*
- *sediments and sediment tracking and contamination in various water sources; lakes, rivers, estuaries, seas, etc.*
- *soil, especially the effects of soil properties on plants, in China*
- *plants, and plant roots. Includes waste remediation using plants, various health benefits of plants, and plant characterization and analysis.*
- *all matter of plants, both food plants and non-food plants, including seeds and their properties, such as germination rate*
- *various species of organisms and plants, and their characteristics. Also talks about DNA and comparing it between species.*
- *the identification of mainly zoological and entomological species in China.*
- *plant species.*

An expanded version of this level 4 taxonomy that includes the raw data for each elemental cluster is listed and summarized in Appendix 4, which can also be viewed as a flat taxonomy from a Level 4 perspective.

Comparison of China's and USA's Investment Strategies

In the section on comparing China's research citations with those of India and Australia, the three criteria of 'right job', 'job right', and productivity/ progress were described. In any research evaluation, the first criterion to consider is 'right job'. If the research unit being evaluated is not aiming at the right target, the highest quality approach will not provide results useful to the organization's mission.

A major component of 'right job' is the research investment strategy. This includes the allocation of resources among the components of the research portfolio, and the rationale for that allocation. The taxonomy shown in the previous section reflects the present research investment strategy of China (based on published output). Of particular interest is how this investment strategy compares with that of other countries, and which particular areas China has chosen to emphasize.

One approach to performing such a comparison would be to compare taxonomies of different countries at different hierarchical levels. This requires that categories defined by the clustering algorithms would have similar content and theme, for those categories to be compared directly.

Another approach is based on the philosophy that very specific sub-technology areas should be compared, to identify precisely where different countries emphasize their investment. These critical sub-technologies emphasized by each country become the '***dots' to be connected*** for understanding the overall country research strategy.

How specific should the technology areas be? Let us follow the chain of dis-aggregation, starting from the top. At the highest level would be the research articles for all of China. One could compare the number of research articles in a given year with that of, say, the USA, and draw very general conclusions about overall research output. This was essentially the approach of King, in comparing research output from 31 different countries (King, 2004). Very limited information can be obtained from this level of resolution.

At the next level would be research articles for each technology area for a country. The first author has proposed that making comparisons at this level for critical technologies provides a much more strategically important view of each country's capabilities (Kostoff, 2004d). Recent text mining studies on nanotechnology (Kostoff et al, 2006a) and energetic materials [unpublished] show that China is advancing rapidly in its research article production in these two critical technologies, and is second only to the USA in research article production. However, even these results aggregated at the critical technology level may be too aggregated for critical investment strategy emphasis

analyses. If China is second to the USA, for example, in nanotechnology in general, might there be sub-areas of nanotechnology (e.g., nanocomposites, nanorods, etc) where China is actually leading the USA? And what would be the strategic implications of China heavily emphasizing research investment in such areas?

Thus, at the next level would be sub-critical technology areas, such as nanocomposites or nanorods in the nanotechnology example above. Further levels of dis-aggregation are possible, such as 'metal nanocomposites' or 'heavy metal nanocomposites'. The terminal level of resolution used for the comparison depends on the objectives of the study, and the numbers of articles available at the different levels.

This latter approach was used to compare the relative investment strategies of China and the USA for the present study, with a resolution at about the critical sub-technology level. The approach used was as follows. Ten thousand articles each of USA and China were downloaded from the SCI for 2005. At the time the download occurred, the total number of USA articles was 233,936 and the total number of China articles was 58,044. Thus, the USA had approximately four times the total number of research articles for 2005 as China.

A phrase frequency analysis was performed on each download, and the phrases were then combined. The ratio of frequencies for each phrase was tabulated. Phrases were ordered by ratio of occurrence in each country's download. Two bands were considered: phrases that had a large China/ USA frequency ratio and phrases that had a large USA/ China frequency ratio (the opposite ends of the spectrum). The phrases in these bands were inserted into the SCI, and the absolute values of numbers of records that contained these phrases (for the first 10.5 months of 2005) were obtained. The results are shown on Tables ES13 and ES14.

Table ES13 (Chinese Strengths - SCI)

QUERY PHRASE	# 2005 SCI ABSTRACTS		ABSOLUTE RATIO	NORMALIZED RATIO
	CHINA	USA	(CHINA/USA)	(CHINA/USA)
Neural Network	489	394	1.24	4.96
Lyapunov	222	170	1.31	5.22
XRD	2141	347	6.17	24.68
Nanorods	359	117	3.07	12.27
Nanocomposites	330	328	1.01	4.02
Nanocrystals	451	392	1.15	4.60
Copolymer	496	500	0.99	3.97
Welding	102	123	0.83	3.32
Corrosion Resistance	152	52	2.92	11.69
Compressive Strength	76	67	1.13	4.54

Photodegradation	67	59	1.14	4.54
Zeolite	214	230	0.93	3.72
Ceramics	750	414	1.81	7.25
Alloy	1558	962	1.62	6.48
Heat Treatment	297	224	1.33	5.30

Table ES14 (USA Strengths - SCI)

QUERY PHRASE	# 2005 SCI ABSTRACTS		ABSOLUTE RATIO	NORMALIZED RATIO
	CHINA	USA	(USA/CHINA)	(USA/CHINA)
Arthritis	51	1120	21.96	5.49
Pathology	63	1555	24.68	6.17
Health	371	11273	30.39	7.60
Cancer Risk	15	602	40.13	10.03
Psychiatric	17	1306	76.82	19.21
Cognitive	75	3123	41.64	10.41
Medication	27	1422	52.67	13.17
Galaxy	39	860	22.05	5.51
Antibiotics	80	877	10.96	2.74
Heart Failure	49	1292	26.37	6.59
Mental	63	2655	42.14	10.54
Telescope	55	846	15.38	3.85
Diabetes	123	2832	23.02	5.76
Pain	130	3216	24.74	6.18
Symptoms	171	4921	28.78	7.19

The difference in thematic emphasis between the USA and China is dramatic! ***China emphasizes the hard sciences that underpin defense and commercial needs. The USA emphasizes research areas focused on medical, psychological, and social problems.*** There are even research areas where ***<u>China leads the USA in absolute numbers of research articles published.</u>*** In those areas, China's relative investment strategy is greater than four times that of the USA.

A number of these detailed areas in which China places high emphasis are related to nanotechnology. A recent nanotechnology text mining study (Kostoff et al, 2006a) showed that China was second to the USA in nanotechnology research article productivity. This means that at the next level or two lower in aggregation, there could be nanotechnology sub-areas in which China was actually leading in absolute numbers of research article production, and also areas in which they were well behind the USA in

absolute numbers of research article production. The present analysis confirms that hypothesis, and suggests that the USA should pay particular attention to those areas in which China has chosen to apply substantial relative emphases.

The next two tables are similar to Tables ES13 and ES14, except that they contain common (to USA and China) high frequency phrases that were derived from the Engineering Compendex (EC), instead of the SCI. They also contain comparisions of occurence frequency for a given query term between the EC and the SCI. Both China and the USA had similar numbers of records in the EC (for those records that contained a country address), so no normalization was needed.

Table ES15 contains a set of phrases taken from the Engineering Compendex (EC) in which China had a large lead relative to the USA in terms of the ratio of record occurrences. Those terms and their ratios of occurence were then compared to the ratio of China and USA records in the SCI.

In general, the EC is a much more applied database than the SCI, and some of the words/ phrases chosen in Tables ES15 and ES16 reflect that. Some of the phrases, such as XRD, were high frequency shared phrases not only in the China EC phrase list, but also in the China SCI phrase list. The specific number of records retrieved by a query term may be different in Tables ES13 and ES15 (e.g., XRD), and is due to the fact that the data for these tables were downloaded on different days. There are new records uploaded to the SCI and EC every day, so from day to day there can be an increase in terms of number of records that are returned from a specific query.

Table ES15 (Chinese Strengths – EC)

QUERY PHRASE	# 2005 EC ABSTRACTS		ABSOLUTE RATIO EC	2005 SCI ABSTRACTS		ABSOLUTE RATIO SCI
	CHINA	USA	CHINA/USA	CHINA	USA	CHINA/USA
Bearing Capacity	145	12	12.08	15	13	1.15
XRD	2213	237	9.34	2582	418	6.18
Microhardness	174	22	7.91	129	53	2.43
Photoelectric	86	13	6.62	57	37	1.54
Diesel Engine	152	23	6.61	33	46	0.72
Wavelet Transform	338	54	6.26	119	90	1.32
Fiber Bragg Grating	115	19	6.05	56	19	2.95
Wear Resistance	213	37	5.76	161	63	2.56
Annealing Temperature	214	39	5.49	182	81	2.25
Impact Strength	92	19	4.84	57	27	2.11
Magnetron	285	60	4.75	292	133	2.20
Countermeasures	57	13	4.38	9	59	0.15
Intrusion Detection	100	23	4.35	33	36	0.92
Missile	100	24	4.17	6	45	0.13

Table ES16 (USA Strengths – EC)

QUERY PHRASE	# 2005 EC ABSTRACTS		ABSOLUTE RATIO EC	2005 SCI ABSTRACTS		ABSOLUTE RATIO SCI
	CHINA	USA	USA/CHINA	CHINA	USA	USA/CHINA
Biochemistry	47	1498	31.87	42	445	10.60
Epithelial	9	182	20.22	238	5155	21.66
C-Terminal	17	308	18.12	110	1513	13.75
Microbiology	13	196	15.08	13	207	15.92
Aeronautics	13	176	13.54	1	46	46.00
Transmembrane	14	176	12.57	89	1480	16.63
Viral	10	121	12.10	241	3942	16.36
Prostate	11	136	12.36	103	3828	37.17
Cytoplasmic	13	162	12.46	107	1933	18.07
Patient	28	351	12.54	482	15699	32.57
Peptides	36	408	11.33	313	3132	10.01
Transfection	9	101	11.22	169	980	5.80
Ecosystems	15	164	10.93	82	1158	14.12
Mortality	13	127	9.77	275	8138	29.59

Tables ES15 and ES16 confirm that in the EC, as in the SCI, China's focus is on the hard sciences and especially engineering sciences, whereas the USA's relative focus is on health and biology-based research. In the overtly military-related terms (countermeasures, intrusion detection, missile), China has a commanding presence. One interesting exception is the presence of 'aeronautics' in the list of USA dominant terms. Similar anomalies have been noted in past studies. In technologies that require a large infrastructure, and therefore large investment, China has tended to be under-represented, and that probably accounts for the 'aerospace' under-emphasis.

SUMMARY AND CONCLUSIONS

Structure of Chinese Science in Technical Categories

The first major division (first level) in the 2005 taxonomy is physical and engineering sciences (19807 records) and life sciences and mathematics (14539 records). While mathematics is applicable to physical, engineering, and life sciences, it typically is categorized with the physical sciences. It appears that the life-sciences-based terminology of some branches of mathematics (genetic programming, genetic algorithms, neural networks, etc) resulted in mathematics being assigned by the clustering algorithm to the life sciences category. For purposes of this discussion, mathematics will be treated as part of the physical and engineering sciences category.

The physical and engineering sciences category (with mathematics included) has 3.66 times as many records as life sciences, which shows China's strong emphasis in physical and engineering sciences relative to life sciences The physical and engineering sciences branch further splits into chemistry, physics/ materials, and mathematics ("chemical

reactions, chemistry" (5841), "physics, thin films,alloys, and nanomaterials, the mechanical properties of materials" (13966), "mathematics, algorithm and program development, modeling (mathematical & algorithmic), system modeling" (7162)). The "physics, thin films, alloys, and nanomaterials, the mechanical properties of materials" category has almost three times as many records as the "chemical reactions, chemistry" category, and twice the records of the mathematics category. The other main branch of the tree, life sciences and mathmatics, consists only of life sciences ("cellular and genetic biology, health, and geophysics/geology" (7377)) for the present discussion.

The third level of the hierarchy offers further differentiation. The chemistry category divides into a more fundamental structural sub-category ("molecular and crystal structure" (1813)) and a more applied dynamic sub-category ("chemical reactions and behaviors, chemical analysis, liquid chromatography" (4028)), with twice the output in the applied dynamic sub-category, The physics/ materials category divides into a physics sub-category ("physics, thin films and optics" (5910) and a materials sub-category ("structural and mechanical properties of materials, materials analysis" (8056)), The physics sub-category focuses on surface phenomena (e.g., films), and much of the thin film work could be considered as overlapping with the materials category. The materials sub-category focuses on bulk material phenomena, with the exception of the nanomaterials component. Thus, the physics/ materials category has a heavy weighting toward the materials component, with attention paid to both bulk and surface phenomena. The mathematics category divides into a more fundamental mathematical analysis category ("mathematics: differential equations, algebraic equations" (2333)) and a more applied mathematical modeling sub-category ("mathmatical modeling and genetic algorithems" (4829)), with twice the output in the more applied modeling category. The life sciences category divides into a fundamental biology category ("genetic and cellular expression" (3739)) and a combination of applied clinical medicine and environmental geobiophysics ("Chinese geophysics; health research" (3638)).

Structure of Chinese Technology in Technical Categories

These conclusions are based on EC data. The first level of the technology taxonomy has two categories: Computer Sciences (4721 records) and Physical Sciences (5228 records). Percentage-wise, this is a split of 47/53%. The second taxonomy level is generated by sub-dividing each first level category by two. Computer Sciences divides into Cybernetics & Systems Engineering (3902) and Signal Processing (819), while Physical Sciences divides into Materials Science (3477) and Chemistry & Nanotechnology (1751). The lower taxonomy levels are generated in the same manner as above. In the fourth taxonomy level, several categories stand out as receiving significantly more focus than the others. These categories are Systems Theory (23.4%) and Structural Mechanics & Materials (20.1%) with the most focus, followed by Applied Measurements (9.3%), Power/Energy Market Enterprises (8.6%), and Organic Chemistry (7.2%) as compared to the other eleven categories ranging from 1.3 – 4.9%.

Additionally, the Abstracts also cover a broad range of fields ranging from industrial to high tech electronics that are indicative of a large society growing to sustain itself and

become technologically competitive on a global scale. Examples of some key areas receiving emphasis are as follows; Energy/Power Generation, Mining, Materials & Structural Mechanics, Signal Processing, Systems Engineering, Transportation & Traffic flow, Robotics, Sensors & Diagnostics, Advanced Communications, Nanotechnology, Assessment Methods, Mathematics, Environmental & Ecological, Modeling & Simulation, and Control Theory. All of these areas have applications that can be of military significance.

Efforts in energy and power generation include hydroelectric, nuclear, and fossil fuels (such as coal), with the emphasis on the latter. Improvements are being sought for more efficient yields of energy from these resources. Power generation spans from the Power Plants to vehicles to small electronic devices. The efforts in fossil fuels are closely tied with mining and structural developments.

The efforts in mining include identifying areas of opportunity for different resources, and improving mine structures to prevent collapse. These efforts can be closely associated with other work in remote sensing to help locate resources and conduct environmental impact studies. The same efforts to improve structural developments in mines might also be applied to underground facilities. Materials and structural mechanics fields range from the macro level (geologic formations and superstructures) to the micro and nano level (e.g. particles, ligands, compounds, films, and nanowires). There are specific references of structural analyses being done for a *New-Concept Submarine* and *low noise torpedo*, as well as for solid rocket motors.

Systems, control theory, modeling, and simulation are closely associated with all other areas. They range from the macroscopic, such as improving trafficability movements of large vehicles, resources, people, and robotics to the microscopic, such as gene manipulation. They are being done for topics small and large in numbers, such as tracking and/or controlling Unmanned Aerial Vehicles (UAVs) in a dense air traffic environment. Vibrational analysis is being performed with specific applications to missile launches on naval ships. Signal processing techniques are also closely related to these fields as well and incorporate wavelets, digital signal processing and neural networks. Applications of these studies include remote detection and biometrics.

Assessments, testing, and diagnostic methods include studies of text mining, Transmission Electron Microscopy (TEM), X-ray Diffraction (XRD), Magnetic Resonance Imaging (MRIs), and other high precision diagnostic instrumentation that can be used in high-yield weapons development. Long range plans are made that include research, such as the specific reference to a new 5-year coal mining plan.

Communications related research studies topics such as fiber optics, optical communications in seawater, digital, wireless networks, mobile networks, millimeter waveguides, blind signature schemes in cryptography, and security protocols.

<u>Relative Research Investment Emphases between China and USA</u>

The relative frequency of China and USA research articles in the SCI for 2005 was computed. The difference in thematic emphasis between the USA and China is dramatic! China emphasizes the hard sciences that underpin defense and commercial needs. The USA emphasizes research areas focused on medical, psychological, and social problems. There are even research areas where China leads the USA in absolute numbers of research articles published. This means that, in those areas, China's relative investment strategy is greater than four times that of the USA.

A number of these detailed areas in which China places high emphasis are related to nanotechnology. A recent nanotechnology text mining study showed that China was second to the USA in nanotechnology research article productivity. This means that at the next level or two lower in aggregation, there could be nanotechnology sub-areas in which China was actually leading in absolute numbers of research article production, and also areas in which they were well behind the USA in absolute numbers of research article production. The present analysis confirms that hypothesis, and suggests that the USA should pay particular attention to those areas in which China has chosen to apply substantial relative emphases.

Relative Technology Investment Emphases between China and the USA

In the Engineering Compendex, as in the Science Citation Index, China's focus is on the hard sciences and especially engineering sciences, whereas the USA's relative focus is on health and biology-based research. In the overtly military-related terms (countermeasures, intrusion detection, missile), China has a commanding presence in relative emphasis. One interesting exception is the presence of 'aeronautics' in the list of USA dominant terms. Similar anomalies have been noted in past studies. In technologies that require a large infrastructure, and therefore large investment, China has tended to be under-represented, and that probably accounts for the 'aerospace' under-emphasis.

Country Bibliometrics

What are the most utilized journals for China as a whole? The twenty journals containing the most Chinese articles for 2004-2005 appear to be concentrated in chemistry, materials, and physics, with one medical jounal. Many are Chinese journals.

What are the most prolific institutions? The twenty most prolific institutions for research articles are the Chinese Academy of Sciences in aggregate (all branches), followed by universities. The most prolific of the universities are Tsing Hua, Zhejiang, Peking, Shanghai Jiao Tong, and Hong Kong.

Which countries collaborate the most with China? The most collaborative countries with China, as reflected in the authors' country listing from SCI articles, are as follows:

China (118659); USA (9919); Japan (4247); Germany (2450); England (2295); Canada (1923); Australia (1811); France (1374); Singapore (1334); South Korea (1197); Taiwan (870); Russia (651); Italy (632); Sweden (626); India (623).

What is the citation impact of collaboration? Two cases were compared. The first case consisted of all research articles in the SCI published from 1995-1999 having at least one author with a Peoples Republic of China address. The second case consisted of all research articles in the SCI published from 1995-1999, retrieved using the following address query that essentially generates Chinese-only authored articles: (PEOPLES R CHINA NOT (USA OR JAPAN OR GERMANY OR HONG KONG OR (ENGLAND NOT NEW ENGLAND) OR CANADA OR ITALY OR FRANCE OR AUSTRALIA OR SOUTH KOREA OR TAIWAN OR NETHERLANDS OR SWEDEN OR RUSSIA OR INDIA OR SINGAPORE OR SWITZERLAND OR SPAIN OR BRAZIL OR SCOTLAND OR FINLAND OR MALAYSIA OR ROMANIA OR AUSTRIA)). These countries were the main research collaborators with China in the 1995-1999 time frame.

The first case (China and collaborators) produced the following results:

- Articles retrieved, 83689;
- Median citations of total articles retrieved, 2;
- Median citations of top ten cited articles retrieved, 604;
- Median citations of top 5% articles retrieved, 35.

The second case (China only) produced the following results:

- Articles retrieved, 62018;
- Median citations of total articles retrieved, 2;
- Median citations of top ten cited articles retrieved, 239;
- Median citations of top 5% articles retrieved, 25.

Thus, approximately one-quarter of research articles having at least one author with a China address were the result of China's collaboration with other countries. The impact of collaboration was negligible on median citations of the total. The impact of collaboration was substantial on the top ten cited articles, and was noticeable on the top 5% of cited articles.

What are the main technical areas for collaboration? Two examples were selected: China's collaboration with the USA and with Japan. The two areas that stand out for both collaborative groups (China-USA; China-Japan) are biomedical and nanotechnology. However, when frequencies of similar phrases from each group are taken into account, for the China-USA articles, biomedical comes first and nanotechnology second. For the China-Japan articles, nanotechnology ranks higher relative to biomedical. Given China's relative (to the USA) investment strategy emphasis in nanotechnology, as will be shown later, and lesser relative investment emphasis in biomedical, the collaborative research relationship with Japan appears to be more quid pro quo than is the relationship with the USA.

Which journals are cited the most? The top ones cited most appear to be primarily English Language journals in contrast to many of the top most prolific journals being Chinese Journals. This suggests that at this time there may be a larger dependence on English Language (i.e. foreign) journals than on China's own internal journals, at least for Chinese papers published in journals accessed by the SCI.

The median Impact Factor of the nineteen journals containing the most papers cited by Chinese-authored papers is 5.45. This is contrasted with the median Impact Factor of the eighteen journals containing the most Chinese-authored papers (0.72). This order of magnitude difference in Impact Factor between the journals in which the Chinese researchers publish and the journals that Chinese researchers reference indicates they may not be publishing in the highest research impact journals. Since Impact Factor is discipline dependent, a discipline-based comparison of the overall Chinese results above (confined to those journals) may be instructive.

The median of the Impact Factors of the seven top physics journals in which the Chinese authors publish is 1.25, whereas the median of the Impact Factors of the seven top physics journals that they cite is 4.31, a factor of ~3.5 difference. The median of the Impact Factors of the three top chemistry journals in which they publish is 0.41, whereas the median of the Impact Factors of the seven top chemistry journals they cite is 3.46, a factor of nine difference. The median of the Impact Factors of the six top materials journals in which they publish is 0.49, whereas the Impact Factor of the one materials journal they cite is 1.71, a factor of ~3.5 difference. The one top general science journal in which they publish has an Impact Factor of 0.68, whereas the three top general science journals they cite have a median Impact Factor of 31.86, a factor of more than forty difference. The top medical journal in which they publish has an Impact Factor of 0.46, while the top biology journal they cite has an Impact Factor of 6.36.

While these comparisons are for the top ~twenty journals only, and the Impact Factors have not been weighted by the numbers of papers in each journal, it is quite clear that, on average, the Chinese researchers are not publishing extensively in the high research impact journals they are referencing.

A slightly different journal Impact Factor comparison was made for the discipline of nanotechnology. To compare Impact Factors of journals in which Chinese authors publish nanotechnology papers with journals in which USA authors publish nanotechnology papers, a separate retrieval was made in mid-January 2006. The most recent 2000 articles that had at least one Chinese author but no authors from Japan, USA, Germany, France, South Korea, England, Russia, Italy, India, Spain, Taiwan, or Canada were retrieved, as were the most recent 2000 articles that had at least one USA author but no authors from Japan, China, Germany, France, South Korea, England, Russia, Italy, India, Spain, Taiwan, or Canada. The countries excluded are the major producers of nanotechnology research articles (Kostoff et al, 2006a). The purpose of this comparison is to identify Impact Factors of the journals containing essentially intranational nanotechnology papers. For the eleven journals containing the most nanotechnology papers with USA authors, and the eleven journals containing the most nanotechnology

papers with Chinese authors, the median Impact Factor of the USA journals is 3.9, whereas the median Impact Factor of the Chinese journals is 1.19, a difference of more than a factor of three.

To further place these numbers in perspective, an analysis was done to identify the journals cited by all nanotechnology researchers globally, emphasizing obvious Chinese journals. A study of the 2003 global nanotechnology literature retrieved over 21000 articles on nanotechnology (Kostoff et al, 2006a). Over 31000 journals were referenced in these articles.

There were 206 obvious Chinese journals listed (CHIN* or SINICA, in journal name). Most had one or two citations. There were a handful of Chinese journals that appeared significant, and even these had two orders of magnitude less citations than the leading international journals. Even though China's nanotechnology research article productivity was second to that of the USA (Kostoff et al, 2006a), most of its domestic journals in which these nanotechnology papers were published were receiving relatively negligible numbers of citations.

How does the quality of China's articles compare with that of other countries? Two examples were selected: India and Australia.

A citation comparison approach of papers published in selected technology areas was utilized. Phrases that appeared in each country's technical literature, and were of similar magnitude of occurrence, were selected.

China-India Comparison

Diverse technologies were selected to represent four major categories: Physical Sciences, Environmental Sciences, Material Sciences, Life Sciences. The phrases (technologies) were grouped by these major categories. The first group is Physical Sciences. Out of twenty phrases examined, representing diverse areas of physical sciences, China was a clear winner in fifteen (based on median number of citations of top ten cited articles), India led in one, and four were viewed as even. Clearly, China is the leader in Physical Sciences, based on top ten median numbers of citations.

The second group is Environmental Sciences. Out of ten phrases examined, China was the clear leader in seven, and three were considered even. Clearly, China is the leader in Environmental/ Agricultural Sciences.

The third group is Material Sciences. Out of ten phrases examined, China was the clear leader in seven, India was the clear leader in two, and one was considered even. Clearly, China is the leader in Material Sciences.

The fourth group is Life Sciences. Out of ten phrases examined, China was the clear leader in nine, and one was considered even. Clearly, China is the leader in Life Sciences.

Thus, China was the clear leader in each major category, although there were (isolated) instances where India led in a sub-technology area. It should be re-emphasized that this comparison did not examine relative investment strategies. It focused only on technical areas that had similar magnitudes of investment. It should also be emphasized that there can be many reasons why an article receives or does not receive citations. These include intrinsic quality, research fundamentality (more fundamental articles receive, on average, more citations), and journal visibility. To identify which of these causation factors is operable, samples of articles would have to be retrieved, and each article examined in detail. Such an in-depth analysis was beyond the scope of the present study.

China-Australia Comparison

A diverse selection of phrases was made, to represent four major categories: Physical Sciences, Environmental Sciences, Engineering Sciences, Life Sciences. Out of eighteen phrases examined, representing diverse areas of Physical Sciences, Australia was a clear winner in eleven, a close winner in six, and tied with China in one. Australia is clearly the leader in Physical Sciences, based on top ten median numbers of citations.

The second group is Environmental/Agricultural Sciences. Out of fifteen phrases examined, Australia was the clear leader in all fifteen. Australia was an obvious winner over China in Environmental/Agricultural Sciences.

The third group is Engineering Sciences. Out of eleven phrases examined, Australia was the clear leader in six, a close leader in three, and was tied with China in two. Although Australia is the winner in Engineering Sciences, China's foucus on engineering and applied sciences can be seen, even compared to a first world country such as Australia.

The fourth group is Life Sciences. Out of sixteen phrases examined, Australia was the clear leader in all sixteen. This result is not only expected, but is further evidence that China is currently putting more relatively research effort into engineering and applied sciences than any other category, especially Life Sciences.

Thus, Australia was the clear leader in each major category, although there were (isolated) instances where China was tied in a sub-technology area. It should be re-emphasized that this comparison did not examine relative investment strategies. It focused only on technical areas that had similar magnitudes of investment.

Final Observations

China has expanded its documented research output dramatically in the last decade. However, its citation performance, based on the present country assessment and other specific technology assessments, is competitive with that of other developing nations but not competitive with that of the developed nations. It is not clear whether this non-competitiveness is due to overly applied research, lower quality research, both, or neither.

To resolve this issue, experts are required to sample similar articles written by Chinese and non-Chinese authors in a number of disciplines, compare these article pairs for quality and level of development, and correlate them with citations. While resource intensive, this next step is required to resolve the quality/ citation issue.

2 Background

Core Competencies

The core competence concept was initially promulgated in 1990 as "an area of specialized expertise that is the result of harmonizing complex streams of technology and work activity" (Hamel and Prahalad, 1990). It was developed for a business context, and reflected the collective learning and coordination skills underlying a firm's product lines. According to the original proposers, core competencies are the source of competitive advantage and enable the firm to introduce an array of new products and services. They lead to the development of core products, which are then used to develop a larger number of end user products.

Since the original core competence article, many follow-on studies have been performed. Other definitions of core competence have been advanced (e.g., Galunic and Rodan, 1998). However, common features among the different core competence definitions include the following:

- Critical mass of people
- Synergy of coordinated sub-disciplines
- High quality output
- Unique capabilities
- Substantial fraction of organization's total development investment

While the original definition, and most follow-on definitions, have applied to business organizations, the concept can be extrapolated to nations. The five features above characterize national core competencies. In the present paper, a national research core competence is defined as a technical area that 1) contains a critical mass of researchers; 2) consists of coordinated and synchronized sub-disciplines; 3) produces high quality output; 4) offers unique national capabilities; and 5) contains a visible fraction of research investment. In other words, a national research core competence is a synergy of individual expertise that is aggregated and coordinated over multiple technical disciplines, and is expressed as a national research strategic investment.

The text mining approach of the present paper will address a sub-set of the above features (identification of China's main research thrusts, volume of research output in main research thrusts, relative quality of selected major research thrusts) to assess potential Chinese research competencies. Further subjective analysis (beyond the scope of the present paper) is required to characterize the remaining necessary features of a national core competence.

This paper will not discuss the desirability of employing core competencies in managing research. The first author has consulted with companies and agencies on practical aspects of implementing core competencies in research management. Within an organization, development of research core competencies tends to receive preferential and protected funding, which are very important in times of economic turndown. Serious employee

morale problems can result for those researchers who are not associated with core competence development, since they have been placed in a more vulnerable position. The alternative, defining all the organization's development thrusts as core competencies, dilutes the purpose of utilizing core competencies to help manage research, and renders them ineffective.

Country Technology Assessments

National science and technology (S&T) core competencies represent a country's strategic capabilities in S&T. Knowledge of country core competencies is important for myriad reasons:

d) Priority technical areas for joint commercial or military ventures
e) Assessment of a country's military potential
f) Knowledge of emerging areas to avoid commercial or military surprise

Obtaining such global technical awareness, especially from the literature, is difficult for multiple reasons:

e) Much science and technology performed is not documented
f) Much documented science and technology is not widely available
g) Much available documented science and technology is expensive and difficult to acquire
h) Few credible techniques exist for extracting useful information from large amounts of science and technology documentation (Kostoff, 2003a)

Most credible country technology assessments are based on a combination of personal visitations to the country of interest, supplemented by copious reading of technology reports from that country. Such processes tend to be laborious, slow, expensive, and accompanied by large gaps in the knowledge available. The more credible and complete evaluation processes will focus on selected technologies from a particular country, and provide in-depth analysis.

For the past half century, driven mainly by the Cold War, a large number of country technology assessments were performed (e.g., Bostian et al, 2000; Leneman, 1984; Stares, 1985; Hutubessy et al, 2002; Mooney and Seymour, 1996; McIntire, 2003; Campbell et al, 1985; Klinger, 1990; Gray et al, 1993; Lanzerotti et al, 1986; Duncan et al, 1988; Spender et al, 1989; Davidson et al, 1990). The last decade has seen an expansion in focus to technologies of major economic competitors. Over the past two decades, some of the most credible of these country technology assessments have come from two organizations: World Technology Evaluation Center (WTEC-Loyola Univ) and Foreign Applied Sciences Assessment Center (FASAC-SAIC). In conducting their studies, both of these organizations would gather topical literature from the country of interest, assemble teams of experts in the topical area, have the teams review the literature as well as conduct site visitations, and have the teams brief their findings and

write a final report. The studies performed by these groups remain seminal approaches to country technology assessments.

Text Mining Technology Assessments

The first author's group has been developing text mining approaches to extract useful information from the global science and technology literature for the past decade (Kostoff, 2003a; Kostoff et al, 1997, 1998a, 1999, 2000a, 2000b, 2001a, 2001b, 2002, 2004a, 2004b, 2004c, 2005a, 2005b, 2005c, 2005d, 2006a, 2006b). These studies have typically focused on a technical discipline, and have examined global S&T efforts in this discipline. It is believed that such approaches, with slight modification, could be adapted to identifying the core S&T competencies in selected countries or regions, including estimation of the relative levels of effort in each of the core technology areas. It is also believed that coupling of the text mining approach with WTEC and FASAC approaches would amplify the strengths of each approach and reduce the limitations. The text mining component would be performed initially to identify:

- Key core competencies and technology thrusts in the country of interest
- Key interdisciplinary thrusts
- Approximate levels of efforts in technology-specific competency areas and in interdisciplinary areas
- Highly productive researchers
- Highly productive Centers of Excellence, including those not well known
- Highly cited researchers

Once the key technologies, researchers, and Centers of Excellence had been identified, then site visitation strategies could be developed. The second phase of the effort would be the actual site visitations. A key step in this hybrid process would be demonstration of the ability of text mining to identify the targets of interest with reasonable precision in a timely manner at an acceptable cost. These three driving parameters (performance, time, cost) could be traded-off against each other to provide a balance acceptable and tailored to a variety of potential customers.

China's Science and Technology Enterprise

China's R&D Expenditures

China regards basic research as the foundation of the development of future technologies, as well as a driving force for sustainable long-term development of its economy (Jiang, 1997; Peoples Daily Online, 2000; Chinese Embassy, 2005). As a developing country China's current S&T development policy requires that available resources be concentrated on the development of selected high technologies that are key to the nation's economic development. In fact, this kind of policy and strategy has been applied to many other government-funded development programs, such as China's military modernization programs (Cox, 1999). Strengthening basic research has been a goal

during the ninth and now the Tenth FYP periods. Both FYPs called for efforts to make breakthroughs in selected areas (MOST, 2005).

Since 1997-1998, China's Gross Expenditure on Research and Development (GERD) growth has been slightly higher than the Gross Domestic Product (GDP) growth, reflecting the government's accelerated effort in S&T development. China has been encouraging product-development R&D activities to make S&T contribute to its economic development. For example, in 2002, 75 percent of the nation's R&D spending went to product development and another 19 percent to applied research (MOST, 2003). In 2002, the Chinese Academy of Science (CAS) increased its spending on basic research to 40 percent of its total outlay, aiming at Nobel-level fundamental research. It has also taken measures to increase its scientists' creativity (Hsiung, 2002).

Despite this, many Chinese scientists argue that basic research is seriously under funded. In 2001, China's basic research funding in the country was 5.3 percent of total R&D expenditures, compared with a ratio of 16 to 20 percent in the United States, Western Europe, and Japan (Blanpied, 2002). In 2003 China had about 0.86 million people involved in R&D activities, compared with 1.26 million in the U.S. and about 0.67 million in Japan (Xinhua, 2003). China's R&D spending remains at a low level in terms of the GERD-GDP ratio compared with several scientifically-important developed countries, and this situation is unlikely to change significantly in the near future. In 2003 the ratio of China's GERD to its GDP was 1.3 percent compared to 2.6 percent for the US and 3.3 percent for Japan. China's goal for spending on R&D by 2005 is for 1.5 percent of GDP.

In 2004, state-owned enterprises accounted for 66.83 percent of the total R&D performed in the country, R&D institutes for 21.95 percent, and universities for 10.22 percent (MOST, 2005). China (like most developed scientific countries, including the United States and Japan) also encourages non-government sectors to support R&D from their own funds. In 2003, governments (central and provincial) contributed 29.9 percent of total R&D support in China, enterprises 60.1 percent, foreign sources 2 percent, and the remaining 8% accounted for by unspecified "other" sources. However, among the enterprises' expenditures, it was estimated that approximately half of the amount for R&D came from state-owned enterprises (SOEs), and thus indirectly from the central government. If so, then 62 percent of China's R&D expenditures in 2004 came either directly or indirectly from government and only 29 percent purely from private enterprises. In the United States, private industry accounts for over 65 percent of all R&D support, with government accounting for somewhat less than 30 percent. In Japan, private industry accounts for a slightly higher percentage of total R&D support than in the United States, and government for slightly less (NSB, 2004).

China's S&T Organizational Structure

The State Council of the central government is the highest administrative body of China. There are 6 major ministry-level administrative organizations directly under the State Council that handle the nation's S&T development activities. A Leading Group on

Science and Technology, chaired by the Prime Minister, is located organizationally between the State Council and these administrative organizations. However, most observers agree that it is relatively ineffective in setting R&D priorities. These organizations include the Ministry of Science and Technology (MOST), the Ministry of Education (MOE), the Commission of Science, Technology and Industry for National Defense (COSTIND), the Chinese Academy of Sciences (CAS), the Chinese Academy of Engineering (CAE), and the National Natural Science Foundation of China (NSFC) (Hsiung, 2002). Among those organizations, MOST, COSTIND, and MOE have policy-making authority, in addition to varying degrees of funding authority; CAS (which receives substantial funds from the government as a budget line item to support its research activities) and CAE have advisory power; and NSFC provides research funds.

Following is a brief introduction to each organization.

Ministry of Science and Technology

The predecessor of the Ministry of Science and Technology was the State Science and Technology Commission (SSTC), which was responsible for managing and organizing China's S&T activities within a centralized planning economy. After losing its original centralized authority, SSTC's name was changed to MOST in March 1998, and its basic function shifted from research activity control to policy-making and administrative management. Some key functions of MOST include:

- Formulating strategies and policies for S&T development
- Conducting research on major S&T issues related to economic and social development
- Administering national technological industry development zones
- Promoting international S&T cooperation and exchanges
- Managing and publishing S&T information

MOST also provides substantial support for research, primarily through special large-scale programs.

Ministry of Education

The Ministry of Education, founded in 1949, is the highest administrative organization in China responsible for education policymaking, education-related laws and regulations, educational development strategies, management of higher education institutions, and vocational and adult education and occupational training. It provides indirect research support by virtue of its role as the principal government supporter of the national universities. Its major functions in S&T development include:

- Promoting commercialization and application of scientific research achievements, especially on high and new technologies
- Providing guidelines to universities undertaking major national scientific research projects

- Overseeing key state laboratories and research centers at higher education institutions

Commission of Science, Technology and Industry for National Defense

The Commission of Science, Technology and Industry for National Defense, was formed in August 1982 by merging the National Defense Science and Technology Commission, the National Defense Industries Office of the State Council, and the Office of the Science, Technology, and Armaments Commission of the CPC Central Military Commission. It is China's top national defense administrative organization. It incorporates some administrative functions of the Department of National Defense and various military-industrial corporations. Its functions in S&T include military research and development and military application of commercial technologies. China National Space Administration (CNSA) was established as an internal structure of COSTIND, which is responsible for enforcement and management of China's national space science policies.

Chinese Academy of Sciences

The Chinese Academy of Sciences, founded in November 1949 on the model of the Soviet Union, is China's premier natural science and technology research organization. CAS operates over a hundred research institutes nation-wide and has over 500 private S&T enterprises spun off from its institutes. Baseline support for these activities is provided by a line item in the central government's budget. However, CAS institutes are also obliged to seek additional support through contracts with enterprises, and frequently obtain revenue from their own spin-off enterprises as well. CAS has over 600 academicians elected as the foremost experts in their fields from over one million scientists and engineers in China. In addition to its primary role in scientific research and technological development, CAS offers graduate programs in natural sciences and applied research.

CAS is headquartered in Beijing, with a number of administrative offices throughout China. There are 5 divisions in CAS, forming China's highest advisory bodies on S&T development. They are mathematics and physics, chemistry, biological sciences, earth sciences, and technological sciences. CAS members and institutes serve as consultants to the government, providing S&T policy advice.

Chinese Academy of Engineering

The Chinese Academy of Engineering, founded in 1994, is China's premier advisory institute of engineering. It consists of 7 divisions, which include:

- Mechanical and vehicle engineering
- Information and electronic engineering
- Chemical, metallurgical, and materials engineering
- Energy and mining engineering
- Civil engineering, hydraulic engineering and architecture

- Agriculture, light industries, and environmental engineering
- Medicine and health engineering

It also has over 600 academicians to provide advice and guidelines on China's engineering development. However, unlike CAS, CAE does not have its own research institutes. Instead, research is carried out in engineering departments at universities throughout China.

National Natural Science Foundation of China

One of China's national-level efforts to strengthen, promote and finance basic S&T research was the launch of its National Natural Science Foundation (NSFC), headquartered in Beijing, in 1986. Unlike the National Science Foundation of the U.S., NSFC only funds the natural sciences, leaving the funding of social science and education to other organizations. It consists of 7 major departments: mathematical and physical science, chemical science, life science, earth science, engineering and materials science, information sciences, and management science. NSFC's research budget increased over 30 times from US$9.7M in 1986 to US$309M in 2002 much higher than China's GDP growth. The NFSC's priority under the tenth five year plan for basic research include manufacturing science and technology, advanced functional materials, basic issues of integrated semiconductor chip system and network computing and information security.

China's S&T Infrastructure

China's national network of S&T research consists of about 5,400 R&D institutions under the supervision of the central-or lower-level governments, about 3,400 research institutions affiliated with universities and colleges, about 13,000 research institutions operated by major state enterprises, and about 41,000 non-government research-oriented enterprises. In addition, there are more than 160 national academic societies under the jurisdiction of the Chinese Science and Technology Association, with branches across the country. The R&D resources include:

- CAS-operated institutes and laboratories
- R&D institutions under the various ministries and administrative agencies
- Institutes and research centers of industrial enterprises
- Universities and colleges
- Local R&D institutions
- R&D institutions affiliated with defense

CAS-operated Institutes and Laboratories

As the premier research organization in China, Chinese Academy of Sciences (CAS) operates 123 research institutes and employs about 60,000 scientists and engineers. Among these institutions, those related to electronics and microelectronics include:

- Institute of Computing Technology (location: Beijing; founded: 1956; technical personnel: 123)
- Institute of Semiconductor (location: Beijing; founded: 1960; technical personnel: 430)
- Institute of Electronics (location: Beijing; founded: 1956; technical personnel: 434)
- Microelectronics R&D Center (location: Beijing; founded: 1986; technical personnel: 310)
- Changchun Institute of Optics, Fine Mechanics and Physics (location: Changchun; founded: 1999; technical personnel: 1,615)
- Shanghai Institute of Microsystem and Information Technology (location: Shanghai; founded: 1999; technical personnel: N/A)
- Shanghai Institute of Optics and Fine Mechanics (location: Shanghai; founded: 1964; technical personnel: N/A)
- Institute of Optics and Electronics (location: Chengdu; founded: 1970; technical personnel: N/A)
- Xi’an Institute of Optics and Fine Mechanics (location: Xi’an; founded: 1962; technical personnel: 414)
- Hefei Institute of Intelligent Machines (location: Hefei; founded: 1979; technical personnel: N/A)

In addition to its own institutions, CAS also jointly builds research facilities with domestic and foreign enterprises and universities. In 1998, for example, CAS and its most successful spin-off, the Legend Group (now also called Leveno), established the Legend Central Institute for the development of computing technologies. In March 2003, CAS and China’s two top universities, Peking University and Tsinghua University, announced the setup of a national nanoscience research center in Beijing, with a first-stage investment of US$30.2M from the central government.

Universities and Colleges

China has over 2,200 institutions of higher education. Most of the top-level or first-tier universities are operated by the Ministry of Education. Regional colleges and universities are under the management of local governments. Among all the universities and colleges, the most prestigious are Peking University (PKU) and Tsinghua University. Other important research universities include Fudan University in Shanghai, Nanjing University in Nanjing, Harbin University of Technology in the Ice City of Harbin in northeast China, Shanghai Jiaotong University, Zhejiang University, University of S&T at Hefei and Xi’an Jiaotong University.

PKU was founded in 1898. It has 12 key national laboratories, with information technology, nanoscience, and nanotechnologies among its most popular research areas. It also has a nanotechnology research center jointly established by its biology, physics, and microelectronics departments.

Tsinghua University, on the other hand, founded in 1911, is home to 15 key national laboratories, with the nation's strongest programs in engineering research. In addition to its main campus in Beijing, it also recently opened a campus in Shenzhen, the most developed city in southern China (adjacent to Hong Kong), to enhance its technology transfer and professional training to meet the increasing demand for new technology and technical professionals in the region.

In 1998, the central government initiated the World Class University Program (985 Program), providing special funds to selected national universities in order to bring them up to international standards.

National Engineering Research Centers

Since the beginning of the Eighth FYP (1991-1995), the Ministry of Science and Technology has started to establish a series of National Engineering Research Centers (NERCs) to accelerate China's S&T development in electronics and microelectronics, computers, communications, automation, electronics product and process development, and other high-technology areas. Many of the centers also operate companies for commercialization and transfer of new technologies.

Through 2001, more than US$2B has been invested and over 100 national engineering research centers have been established in China, with over one-third dedicated to the development of electronics and information technology. The major NERCs related to electronics, microelectronics, and nanotechnologies in China are the NERCs for:

- Application Specific Integrated Circuit Systems (Southeast University)
- Application Specific Integrated Circuit Design (The Institute of Automation, CAS)
- Data Communications (the Research Institute of Data Communications of the Ministry of Posts and Telecommunications)
- Flat Panel Displays (Nanjing Electronic Devices Institute)
- Parallel Computers (Institute of Computing Technology, CAS, and the Jingnan Institute of Computing Technology)
- Mobile Satellite Communication (Panda Electronics Group Company)
- Digital Switching Systems (the Information Technology Institute of the People's Liberation Army
- Computer Integrated Manufacturing Systems (Tsinghua University)
- Solid State Lasers (North China Research Institute of Electro-Optics)
- Power Automation (Nanjing Automation Research Institute of the Ministry of Electric Power)
- Specific Pumps and Valves (11th Research Institute of the China Aerospace Corporation)
- Industrial Control Devices and Systems (No. 502 Institute of China Aerospace Corporation)
- Optical Instrumentation (Zhejiang University)
- Polymer Matrix Composites (Harbin Fiber Reinforced Plastics Research Institute)
- Fiber Reinforced Moulding Compounds (Fiber Reinforced Plastics Research and

Design Institute, the State Administration of Building Material Industry)

Science Parks

Science parks have played a significant role in China's S&T development. These allow enterprises and R&D institutes to cooperate and interact in close proximity. Among all the science parks across the country, Zhongguancun Science Park (ZSP), located in Beijing close to both Peking and Tsinghua Universities, is the largest, with the highest concentration of scientific, educational, and research institutes in China. The GDP output of ZSP was about US$5.5B in 2003 and is expected to reach US$7.2B in 2005.

In addition to Beijing, other metropolitan cities, such as Shanghai and Xi'an, have also begun building science parks funded by the Torch Program. Till date 52 science and technology industrial parks have been approved by the State Council. Since 2000, the Ministry of Science and Technology (MOST) and the Ministry of Foreign Trade and Economic Cooperation (MOFTEC) have jointly identified 20 S&T Industrial Parks in Beijing, Tianjin, Shanghai, Shenzhen, Suzhou and other cities as 'the National High-tech Export Bases'.

The setup of High Technology Development Zones is the primary approach used by the Torch Program to accelerate the development of China's high-tech industries. In August 2002, an agreement was reached for a U.S.-China Science and Technology Innovation Park, to be established on the University of Maryland's College Park campus, and officially signed by Ministry of Science and Technology and the Technology Administration of the U.S. Department of Commerce. This is the first overseas research park initiative to be undertaken by China. China's principal partners in the initiative are the Torch High Technology Industry Development Center of MOST and the Administrative Committee of Zhongguancun Science Park, the largest research park in China.

China's Major S&T Development Programs

China's S&T development programs are implemented in 3 different tiers. In the first tier are those aimed at tackling major S&T snags in the nation's economic development. The Spark Program and the National Program for S&T for Sustainable Development, were designed to renovate China's traditional industries and agriculture and to improve labor performance. In the second tier are programs for developing emerging technologies and high-tech industries. Typical programs in this tier are the National High-Technology Research and Development Program (the 863 Program) and the Torch Program. In the third tier are those programs for basic and applied research, such as the National Basic Research Priorities Program.

In the areas of electronics, microelectronics, and nanotechnologies, China has many high-tech projects, ranging from high-speed broadband information systems to new materials development, to boost industrial sectors in the Tenth FYP period (2000-2005). The projects focus on development of new technologies and products such as the third

generation of mobile telecommunications, high-definition color television, satellites for live broadcasting, and digital products.

3 Objectives

Identify the science and technology core competencies of China. Further, generate a process that could be used efficiently and rapidly to assess the science and technology core competencies in other countries of interest. Evaluate the various metrics used in the assessment, and highlight the highest priority metrics for use in future studies.

4 Approach and Results

4.1 Overview

Two major types of information are required for a country science and technology core competency assessment. One is technical infrastructure, which encompasses the prolific performers, journals that contain many of the papers, the prolific institutions, and the most cited papers/ authors/ journals. The other is technology thrusts, and the relationship among the thrusts. This study focused on obtaining both types of information, using multiple approaches for identifying the thrusts and their relationships. Since the study is a proof-of-principle demonstration, many approaches were examined, and only the most efficient are recommended for future studies. Many labor-intensive manual approaches were used, to serve as benchmarks for validating the more automated approaches. Hopefully, future studies can be performed using the automated or semi-automated approaches. Human intervention will still be required, but some of the more mechanistic tasks can be handled by computer.

Two types of results are presented, bibliometrics and taxonomies. Bibliometrics provides an indication of the technical infrastructure (prolific authors, journals, institutions, citations), while taxonomies provides an indication of major technology thrusts and their relationships.

In addition, a citation-based approach was used to identify pervasive research thrusts in China, and compare their investment and impact with those of other countries. This approach is described in detail later in this report. Basically, this approach identifies high frequency technical phrases from analysis of the retrieved China records, retrieves SCI records using selected phrases, and examines citation metrics from these records relative to those from similar countries. Physical, Environmental, Engineering, and Life Sciences records/ themes were included in this analysis.

Section 4.2 describes the database used for the bibliometrics and taxonomy analyses. Section 4.3 presents the bibliometrics approaches and results, where section 4.3.1 presents the publication bibliometrics, and section 4.3.2 presents the citation bibliometrics. Section 4.4 presents the taxonomy approaches and results, where section 4.4.1 presents the manual taxonomy approaches and results, and section 4.4.2 presents the statistical taxonomy approaches and results.

4.2 Databases and Information Retrevial Approach

The Science Citation Index (SCI) database and the Engineering Compendex (EC) were used. The retrieved database used for analysis consists of selected journal records (including the fields of authors, titles, journals, author addresses, author keywords, abstract narratives, and references cited for each paper) obtained by searching the Web version of the SCI for articles that contained at least one author with an China address. At the time the final data was extracted for the computational linguistics component of the present paper, the version of the SCI used accessed about 5600 journals (mainly in

physical, engineering, and life sciences basic research), and the version of the EC used accessed about 5000 journals (mainly in applied research, technology development, and engineering).

Sample records were extracted from the SCI for two different years, 2002 and 2005, and from the EC for years 2000-2003. There were 7780 records with Abstracts retrieved from the SCI for 2002, 34834 records with Abstracts retrieved from the SCI for 2004-2005, and 9949 records with Abstracts retrieved from the EC for 2000-2003. The Abstracts were used for the computational linguistics (phrase analyses, document clustering). For the India and Australia research impact comparisons with China, records were extracted from 1998 for each country for specific technology queries, and citations of those records compared. For the China-USA investment strategy comparison, records were extracted from the SCI for 2005 for each country for specific technology queries, and numbers of those records compared. Finally, for the aggregate China bibliometrics analysis, records were extracted for 2004-2005 for the publicartioin bibliometrics and 2002 for the citation bibliometrics, and for the selected category bibliometrics analysis, records were extracted covering the time frame 2003-early 2005.

The SCI and EC databases selected represent a fraction of the available China (mainly research) literature, that in turn represents a fraction of the China S&T actually performed (Kostoff, 2000c). The articles contained within the SCI and EC databases do not include the large body of classified literature, or company proprietary technology literature, although the SCI and EC articles could reference these literatures. The SCI and EC articles do not include technical reports, books, or patents from China S&T, but could again reference these literatures. The SCI and EC data selected cover a finite slice of time (2002 and 2000-2003, respectively). The databases used represent the bulk of the peer-reviewed high quality China research literature, and is a representative sample of all China research in recent times.

4.3 Bibliometrics

The 7780 records retrieved from the 2002 SCI dataset, and the 35706 records retrieved from the 2005 SCI dataset, were imported into an ACCESS template, and the bibliometrics data were extracted using specially developed macros. The 2005 records, which did not contain cited references, were used for publication bibliometrics only, while the 2002 records, which did contain cited references, were used for citation bibliometrics. The first group of bibliometrics results provides a summary view of the Chinese research infrastructure. The second group of bibliometrics results is for selected topics identified from the clustering of research articles by topical similarity.

4.3.1 Overall China Bibliometrics

4.3.1.1 Publication Statistics on Journals, and Organizations

The first group of metrics presented is counts of papers published by different entities. These metrics can be viewed as output and productivity measures. They are not direct

measures of research quality, although there is some threshold quality level inferred, since these papers are published in the (typically) high caliber journals accessed by the SCI.

In all previous text mining studies published by the first author's group, bibliometrics were performed on the overall database retrieved. Since all these previous studies focused on a technology, the resultant bibliometrics provided the technical infrastructure for that technology. In the present case, the focus is on the wide range of technologies being developed within a country. In this section, approximately 35,000 records were downloaded from 2004 to early 2005, and subject to analyses.

4.3.1.1.1 Prolific Journals

The top twenty journals based on number of papers are listed below in Table 1. The first column is the full journal name, the second column is the number of papers in the journal from the database, the third column is the journal's Impact Factor (the Impact Factor is the ratio of cites of recent articles to numbers of recent articles, and can be considered one measure of a journal's ability to attract citations), and the fourth column is the journal's theme. The latter two columns will be discussed in the section on Most Cited Journals. These journals appear to be concentrated in chemistry, materials, and physics, with one journal about medicine. Many are Chinese journals.

Table 1. Most Prolific Journals – 2004-2005

JOURNAL	#PAPERS	IMP FACT	THEME
Acta Physica Sinica	556	1.25	PHYS
PRICM 5: The Fifth Pacific Rim Int'l Conf On Advanced Mat'ls And Processing, Pts 1-	520		MATLS
Chinese Physics Letters	447	1.18	PHYS
Acta Crystallographica Section E-Structure Reports Online	443	0.49	MATLS
High-Performance Ceramics III, Pts 1 And 2	397		MATLS
Chemical Journal Of Chinese Universities-Chinese	338	0.76	CHEM
Spectroscopy And Spectral Analysis	307	0.35	PHYS
Chinese Journal Of Analytical Chemistry	265	0.41	CHEM
Chinese Physics	264	1.56	PHYS
Rare Metal Materials And Engineering	253	0.44	MATLS
Acta Chimica Sinica	253	0.9	MATLS
Materials Letters	242	1.19	MATLS
Chinese Science Bulletin	241	0.68	SCIENCE
Journal Of Rare Earths	237	0.49	MATLS
Chinese Chemical Letters	229	0.31	CHEM
Applied Physics Letters	219	4.31	PHYS
Transactions Of Nonferrous Metals Society Of China	204	0.28	MATLS
Chinese Medical Journal	201	0.46	MED
Communications In Theoretical Physics	195	0.87	PHYS
Physics Letters A	194	1.45	PHYS

4.3.1.1.2 Prolific Institutions

The top twenty institutions are listed below in Table 2.

Table 2. Most Prolific Institutions – 2004-2005

INSTITUTE	#PAPERS
Chinese Acad Sci	7029
Tsing Hua Univ	1886
Zhejiang Univ	1477
Peking Univ	1391
Shanghai Jiao Tong Univ	1204
Univ Hong Kong	1098
Univ Sci & Technol China	943
Nanjing Univ	940
Fudan Univ	905
Chinese Univ Hong Kong	880
Hong Kong Polytech Univ	794
City Univ Hong Kong	683
Shandong Univ	672
Jilin Univ	650
Hong Kong Univ Sci & Technol	591
Huazhong Univ Sci & Technol	591
Harbin Inst Technol	590
Nankai Univ	581
Wuhan Univ	562
Xian Jiaotong Univ	533

4.3.1.1.3 Collaborative Countries

In November 2005, the SCI was accessed to identify the main collaborating countries with China on research articles, in the period 2004-2005. The results are as follows. The format is the name of the country, followed by the number of articles that contained at least one country author and one Chinese author.

> China (118659); USA (9919); Japan (4247); Germany (2450); England (2295); Canada (1923); Australia (1811); France (1374); Singapore (1334); South Korea (1197); Taiwan (870); Russia (651); Italy (632); Sweden (626); India (623).

What is the citation impact of collaboration? Two cases were compared. The first case consisted of all research articles in the SCI published from 1995-1999 having at least one author with a Peoples Republic of China address. The second case consisted of all research articles in the SCI published from 1995-1999, retrieved using the following address query that essentially generates Chinese-only authored articles: (PEOPLES R CHINA NOT (USA OR JAPAN OR GERMANY OR HONG KONG OR (ENGLAND NOT NEW ENGLAND) OR CANADA OR ITALY OR FRANCE OR AUSTRALIA OR SOUTH KOREA OR TAIWAN OR NETHERLANDS OR SWEDEN OR RUSSIA OR INDIA OR SINGAPORE OR SWITZERLAND OR SPAIN OR BRAZIL OR

SCOTLAND OR FINLAND OR MALAYSIA OR ROMANIA OR AUSTRIA)). These countries were the main research collaborators with China in the 1995-1999 time frame.

The first case (China and collaborators) produced the following results:

- Articles retrieved, 83689;
- Median citations of total articles retrieved, 2;
- Median citations of top ten cited articles retrieved, 604;
- Median citations of top 5% articles retrieved, 35.

The second case (China only) produced the following results:

- Articles retrieved, 62018;
- Median citations of total articles retrieved, 2;
- Median citations of top ten cited articles retrieved, 239;
- Median citations of top 5% articles retrieved, 25.

Thus, approximately one-quarter of research articles having at least one author with a China address were the result of China's collaboration with other countries. The impact of collaboration was negligible on median citations of the total. The impact of collaboration was substantial on the top ten cited articles, and was noticeable on the top 5% of cited articles.

What are the main technical areas of collaboration? Two examples will be presented, for the USA and Japan. The 2000 most recent articles for USA-China papers and for Japan-China papers were downloaded from the SCI. A phrase frequency analysis of the Abstracts was performed for each country combination, and the highest frequency high technical content phrases were extracted. The results are as follows.

1) **<u>China-USA</u>**

Single Words
Cells; Expression; Cell; Protein; Gene; Patients; Human; Cancer; Genes; Soil; Treatment; Species; Mice; Disease; DNA; Proteins; Genetic; Receptor; Tumor

Double Word Phrases
Cell Lines; Lung Cancer; Gene Expression; Electron Microscopy; Amino Acid; Cancer Cells; Cell Line; Growth Factor; Transmission Electron; Neural Network; Breast Cancer; X-Ray Diffraction; Cell Death; Increased Risk; Amino Acids; Nasopharyngeal Carcinoma; Prostate Cancer; Ovarian Cancer; Protein Expression; Risk Factors; Cancer Cell; Western Blot; Endothelial Cells; Mass Spectrometry; Neural Networks; Transcription Factor; Blood Pressure; Scanning Electron; Cancer Risk; Cell Growth; Dorsal Horn; Polymerase Chain; Cell Surface; Coronary Artery; Spinal Cord; Tibetan Plateau; Flow Cytometry; Myocardial Infarction

Triple Word Phrases
Transmission Electron Microscopy; South China Sea; Density Functional Theory; Scanning Electron Microscopy; Polymerase Chain Reaction; Risk Of Lung; MRNA And

Protein; Cancer Cell Lines; Cells In Vitro; Central Nervous System; Differential Scanning Calorimetry; Enzyme-Linked Immunosorbent Assay; Severe Acute Respiratory; Squamous Cell Carcinoma; X-Ray Photoelectron Spectroscopy; Acute Respiratory Syndrome; Basic Fibroblast Growth; Breast Cancer Cells; Dorsal Horn Projection; Respiratory Syndrome SARS; Small Interfering RNA; Tumor Necrosis Factor; Atomic Force Microscopy

2) **China-Japan**

Single Words

Cells; Cell; Expression; Patients; Protein; Gene; Films; Particles; Treatment; Film; Soil; Human; Cancer; Mice; Tumor

Double Word Phrases

Cell Lines; X-Ray Diffraction; Magnetic Field; Electron Microscopy; Thermal Conductivity; Scanning Electron; Amino Acid; Cell Line; Gene Expression; Particle Size; Amino Acids; Thin Films; Cell Death; Epithelial Cells; Mrna Expression; Transmission Electron; Growth Factor; Neural Network; Photocatalytic Activity; Dose-Dependent Manner; Prostate Cancer; Breast Cancer; Carbon Nanotubes; Fracture Toughness; Grain Size; Heat Transfer; Atomic Force; Electron Microscope; Film Thickness; Soil Moisture

Triple Word Phrases

Scanning Electron Microscopy; Transmission Electron Microscopy; Polymerase Chain Reaction; X-Ray Diffraction XRD; Differential Scanning Calorimetry; Lattice Thermal Conductivity; Atomic Force Microscopy; East China Sea; X-Ray Photoelectron Spectroscopy; Amino Acid Sequence; Anaerobic Sludge Digester; Density Functional Theory; Green Fluorescence Protein; Chemical Vapor Deposition; Endothelial Growth Factor; Enzyme-Linked Immunosorbent Assay

Representative phrases are selected, and the phrases are ordered by frequency of occurrence. The two areas that stand out for both collaborative groups (China-USA; China-Japan) are biomedical and nanotechnology. However, when frequencies of similar phrases from each group are taken into account, for the China-USA articles, biomedical comes first and nanotechnology second. For the China-Japan articles, nanotechnology ranks higher relative to biomedical. Given China's relative (to the USA) investment strategy emphasis in nanotechnology, as will be shown later, and lesser relative investment emphasis in biomedical, *the collaborative research relationship with Japan appears to be more quid pro quo than is the relationship with the USA.*

4.3.1.2 Citation Statistics on Journals

The second group of metrics presented is counts of citations to papers published by different entities. While citations are ordinarily used as impact or quality metrics [Garfield, 1985], much caution needs to be exercised in their frequency count interpretation, since there are numerous reasons why authors cite or do not cite particular papers [Kostoff, 1998b; MacRoberts and MacRoberts, 1996].

The citations in all the retrieved 2002 SCI papers were aggregated. The journals cited most frequently were identified, and were presented in order of decreasing frequency. Only the 2002 database was used for citations.

4.3.1.2.1 Most Cited Journals

Approximately 2000 journals were cited 10 or more times. The top twenty most cited journals are listed below in Table 3. The most cited journals appear to be primarily English Language journals in contrast to the many of the most prolific journals being Chinese Journals. This suggests that in the 2005 time frame there may be a larger dependence on English Language (i.e. foreign) journals than on China's own internal journals, at least for Chinese papers published in journals accessed by the SCI.

Table 3 Most Cited Journals

JOURNAL	#PAPERS	IMP FACT	THEME
Phys Rev Lett	2592	7.22	PHYS
J Am Chem Soc	2196	6.9	CHEM
Nature	2191	32.18	SCIENCE
Phys Rev B	2027	3.08	PHYS
Science	1995	31.86	SCIENCE
Appl Phys Lett	1737	4.31	PHYS
J Appl Phys	1433	2.26	PHYS
J Chem Phys	1174	3.11	CHEM
P Natl Acad Sci USA	976	10.45	SCIENCE
Anal Chem	924	5.45	CHEM
J Biol Chem	917	6.36	BIOL
Phys Rev D	834	5.16	PHYS
Phys Rev A	779	2.9	PHYS
Inorg Chem	757	3.45	CHEM
J Phys Chem-US	738		PHYS
J Am Ceram Soc	738	1.71	MATLS
Macromolecules	714	3.9	CHEM
Angew Chem Int Edit	687	9.16	CHEM
Astrophys J	641	6.24	PHYS
J Org Chem	612	3.46	CHEM

The median Impact Factor of nineteen of the twenty journals listed in Table 3 (one journal did not have an Impact Factor listed) is **5.45**. This is contrasted with the median Impact Factor of eighteen of the twenty journals containing the most papers and listed in Table 1 (**0.72**). This order of magnitude difference in Impact Factor between the journals in which the Chinese researchers publish and the journals that they reference indicates

Chinese researchers may not be publishing in the highest research impact journals. Since Impact Factor is discipline dependent, a discipline-based comparison of Tables 1 and 3 may be instructive.

The median of the Impact Factors of the seven physics journals in Table 1 is 1.25, whereas the median of the Impact Factors of the seven physics journals in Table 3 is 4.31, a factor of ~3.5 difference. The median of the Impact Factors of the three chemistry journals is Table 1 is 0.41, whereas the median of the Impact Factors of the seven chemistry journals in Table 3 is 3.46, a factor of nine difference. The median of the Impact Factors of the six materials journals in Table 1 is 0.49, whereas the Impact Factors of the one materials journal in Table 3 is 1.71, a factor of ~3.5 difference. The one general science journal in Table 1 has an Impact Factor of 0.68, whereas the three general science journals in Table 3 have a median Impact Factor of 31.86, a factor of more than forty difference. The one medical journal in Table 1 has an Impact Factor of 0.46, while the one biology journal in Table 3 has an Impact Factor of 6.36.

While these comparisons are for the top twenty journals only, and the Impact Factors have not been weighted by the numbers of papers in each journal, it is quite clear that, on average, the Chinese researchers are not publishing extensively in the high research impact journals they are referencing. This issue will be examined further in the nanotechnology bibliometrics section, from another perspective.

4.3.2 Selected Topic Bibliometrics

In all previous text mining studies published by the first author's group (with the exception of (Kostoff et al, 2005b)), bibliometrics were performed on the overall database retrieved. Since all these previous studies focused on a technology, the resultant bibliometrics provided the technical infrastructure for that technology. In the present case, the focus is on the wide range of technologies being developed within a country. Applying the bibliometrics analysis to the total retrieved database for that country only provides part of the total picture. Visitation strategies (one desired application) are typically developed for a specific technology using a group of experts for that technology.

The approach taken in this section is to identify the thematic thrust areas for the clustering performed in the latter part of this report, then retrieve documents that address each theme. The bibliometrics will then be performed on a theme by theme basis. For the present study, one theme is selected as an illustrative example for the bibliometrics in the main body of the text, and three other themes' bibliometrics are shown in Appendix 1.

Based on the computational linguistics (clustering) results, nanotechnology is a thrust area of Chinese research. Starting with the words generated by the clustering algorithm for the nanotechnology cluster, an iterative feedback approach was used to generate the following comprehensive query for this research in China (based on 2003-2005 data):

"NANOPARTICLE* OR NANOTUB* OR NANOSTRUCTURE* OR NANOCOMPOSITE* OR NANOWIRE* OR NANOCRYSTAL* OR NANOFIBER* OR NANOFIBRE* OR NANOSPHERE* OR NANOROD* OR NANOTECHNOLOG* OR NANOCLUSTER* OR NANOCAPSULE* OR NANOMATERIAL* OR NANOFABRICAT* OR NANOPOR* OR NANOPARTICULATE* OR NANOPHASE OR NANOPOWDER* OR NANOLITHOGRAPHY OR NANO-PARTICLE* OR NANODEVICE* OR NANODOT* OR NANOINDENT* OR NANOLAYER* OR NANOSCIENCE OR NANOSIZE* OR NANOSCALE* OR ((NM OR NANOMETER* OR NANOMETRE*) AND (SURFACE* OR FILM* OR GRAIN* OR POWDER* OR SILICON OR DEPOSITION OR LAYER* OR DEVICE* OR CLUSTER* OR CRYSTAL* OR MATERIAL* OR ATOMIC FORCE MICROSCOP* OR TRANSMISSION ELECTRON MICROSCOP* OR SCANNING TUNNELING MICROSCOP*)) OR QUANTUM DOT* OR QUANTUM WIRE* OR ((SELF-ASSEMBL* OR SELF-ORGANIZ*) AND (MONOLAYER* OR FILM* OR NANO* OR QUANTUM* OR LAYER* OR MULTILAYER* OR ARRAY*)) OR NANOELECTROSPRAY* OR COULOMB BLOCKADE* OR MOLECULAR WIRE*".

The query was inserted into the Science Citation Index, and the most recent 4030 records were recovered for the period 2003-early 2005. The bibliometrics analysis was performed on these records.

4.3.2.1 Most Prolific Authors

Table 4 – Most Prolfic Nanotechnology Authors– 2003-2005

AUTHOR	#PAPERS
Li--Y	61
Liu--Y	56
Wang--J	56
Zhang--Y	54
Wang--Y	53
Qian--Yt	50
Zhang--J	49
Wang--X	42
Xu--J	41
Wang--L	38
Li--J	36
Zhang--L	36
Gao--L	35
Wang--H	34
Zhang--Ld	28
Chen--J	27
Liu--Zm	27
Yang--Y	26
Chen--Y	25
Huang--Y	25

Table 4 contains the most prolific Chinese nanotechnology authors. The results illustrate potential problems with author bibliometrics in countries like China (and India). The names are short, common, and many do not have middle initials. There could be multiple authors with the same name.

4.3.2.2. Journals Containing Most Nanotechnology Papers

TABLE 5 lists the 20 journals containing the most nanotechnology papers. There seems to be an even mix of both applied and basic journals. Physics, Chemistry, and Materials journals dominate the list. Approximately 25% of the journals are Chinese.

Table 5 – Journals Containing the Most Nanotechnology Papers– 2003-2005

JOURNAL	#PAPERS
Journal Of Physical Chemistry B	125
Applied Physics Letters	124
Materials Letters	120
Chinese Journal Of Inorganic Chemistry	113
Journal Of Crystal Growth	88
Rare Metal Materials And Engineering	75
High-Performance Ceramics III, Pts 1 And 2	73
Acta Physica Sinica	73
Chemistry Letters	70
Acta Chimica Sinica	64
Physical Review B	62
Thin Solid Films	59
Materials Chemistry And Physics	56
Chemical Journal Of Chinese Universities-Chinese	53
Journal Of Inorganic Materials	52
Chinese Physics Letters	52
PRICM 5: The Fifth Pacific Rim International Conference On Advanced Materials And Processing, Pts 1-	51
Journal Of Solid State Chemistry	48
Colloids And Surfaces A-Physicochemical And Engineering Aspects	45
Applied Physics A-Materials Science & Processing	45

To compare Impact Factors of journals in which Chinese authors publish nanotechnology papers with Impact Factors of journals in which USA authors publish nanotechnology papers, a separate retrieval was made in mid-January 2006. The most recent 2000 articles that had at least one Chinese author but no authors from Japan, USA, Germany, France, South Korea, England, Russia, Italy, India, Spain, Taiwan, or Canada were retrieved, as were the most recent 2000 articles that had at least one USA author but no authors from Japan, China, Germany, France, South Korea, England, Russia, Italy, India, Spain, Taiwan, or Canada. The countries excluded are the major producers of nanotechnology research articles (Kostoff et al, 2006a). The purpose of this comparison is to identify Impact Factors of essentially intranational nanotechnology papers.

Table 5-USA lists the eleven journals containing the most nanotechnology papers with USA authors, whereas Table 5-PRC lists the eleven journals containing the most nanotechnology papers with Chinese authors. The median Impact Factor of the USA journals is 3.9, whereas the median Impact Factor of the Chinese journals is 1.19, a difference of more than a factor of three.

Table 5-USA – Journals Containing Most Nanotechnology Papers – USA Authors

JOURNAL	#PAPERS	IMP FACT
Applied Physics Letters	130	4.31
Physical Review B	102	3.08
Journal Of The American Chemical Society	86	6.9
Langmuir	85	3.3
Journal Of Physical Chemistry B	84	3.83
Nano Letters	52	8.45
Chemistry Of Materials	42	4.1
Journal Of Applied Physics	42	2.26
Physical Review Letters	41	7.22
Nanotechnology	36	3.32
Macromolecules	33	3.9

Table 5-PRC – Journals Containing Most Nanotechnology Papers – PRC Authors

JOURNAL	#PAPERS	IMP FACT
Rare Metal Materials And Engineering	112	0.44
Materials Letters	76	1.19
Journal Of Physical Chemistry B	63	3.83
Chinese Journal Of Inorganic Chemistry	60	0.6
Nanotechnology	60	3.32
Applied Physics Letters	56	4.31
Chemical Journal Of Chinese Universities-Chinese	41	0.76
Journal Of Crystal Growth	37	1.7
Chinese Physics Letters	33	1.18
Acta Physica Sinica	30	1.25
Acta Chimica Sinica	27	0.9

All the Impact Factor comparisons lead to one inescapable conclusion. The Chinese research article authors are not publishing (on average) in the high research impact journals that they reference, or in which the USA research article authors publish (on average). It is not clear whether the Chinese articles are too applied for the high Impact Factor journals, are of insufficient quality for these journals, or have other reasons.

4.3.2.3. Most Prolific Institutions

Table 6 – Most Prolific Nanotechnology Institutions – 2003-2005

INSTITUTIONS	#PAPERS

Chinese Acad Sci	1063
Tsing Hua Univ	260
Univ Sci & Technol China	203
Nanjing Univ	185
Zhejiang Univ	184
Peking Univ	160
Jilin Univ	125
Fudan Univ	117
Shanghai Jiao Tong Univ	108
Shandong Univ	102
City Univ Hong Kong	78
Wuhan Univ	70
Nankai Univ	68
Hong Kong Univ Sci & Technol	66
Tianjin Univ	65
Harbin Inst Technol	65
Xian Jiaotong Univ	62
Hunan Univ	62
Beijing Univ Chem Technol	54
Hong Kong Polytech Univ	49

The 20 most prolific institutions are listed in Table 6. The first institution, The Chinese Academy of Science, dominates the list. Eighteen of the institutions are universities, and the remaining two are research institutions.

4.3.2.4. Most Prolific Countries

Table 7 – Most Prolific (Collaborative) Nanotechnology Countries – 2003-2005

COUNTRY	#PAPERS
Peoples R China	4030
USA	187
Japan	95
Germany	54
Singapore	49
Australia	35
France	30
South Korea	29
England	27
Taiwan	23
Canada	22
Sweden	12
Spain	9
Russia	8
Belgium	6
India	6
Israel	6
Italy	6

Denmark	4
Malaysia	3

The USA is the dominant collaborator, followed by Japan, and by a third tier of Germany and Singapore.

How does collaboration impact the quality of the joint papers in nanotechnology. The following short analysis was performed to address this question. Three classes of nanotechnology research articles from the SCI were selected, published in 1999: 1) those with at least one China-based author, but no USA-based author; 2) those with at least one USA-based author, but no China-based author; 3) those with at least one USA-based author and one China-based author. The following results were obtained (first number is total records retrieved; second number is median citations of total records retrieved; third number is median citations of top ten records; fourth number is median citations of top 5% of records):

1) CHINA NOT USA (1375; 4; 118; 52)
2) USA NOT CHINA (4142; 12; 537; 124)
3) USA AND CHINA (63; 10; 48; 101)

Interestingly, the ratios of the median of the top 5% parallel rather closely the ratios of the overall medians. In the USA-China collaborative group, the numbers are small. There are three articles in the top 5% of the 63 collaborative articles. They have citations of 514, 101, 76, respectively. The next three articles' citations are 49, 48, 48. For the USA-only articles, there are six articles with citations greater than the most-cited collaborative article. For the China-only articles, there is only one article with citations greater than the most-cited collaborative article. This article has five authors with Hong Kong and England addresses; two of the authors have Chinese names, and the other three have Anglo names. This phenomenon was often found in the later section of this report, when comparing China's citations in selected research areas to those of India. The most cited papers in China or India tended to have some co-authorship with the more advanced countries.

4.3.2.5. Citation Statistics on Authors, Journals, and Documents

4.3.2.5.1. Most Cited First Authors

Table 8 – Most Cited Nanotechnology First Authors – 2003-2005

AUTHOR	#CITES
Iijima S	297
Wang J	194
Pan ZW	159
Huang MH	156
Sun YG	152
Xia YN	140
Caruso F	133

Wang ZL	126
Sheldrick GM	118
Zhang J	117
Duan XF	115
Wang X	112
Alivisatos AP	105
Wang Y	97
Hu JQ	96
Hu JT	93
Cui Y	92
Chen J	87
Decher G	87
Liu Y	84

The presence of Wang-J, Wang-Y, Wang-X, Zhang-J, and Chen-J can be correlated with their appearance as first authors in the most cited documents list.

4.3.2.5.2. Most Cited Journals

Table 9 – Most Cited Nanotechnology Journals – 2003-2005

JOURNAL	#CITES
Appl Phys Lett	4217
J Am Chem Soc	3665
Science	3314
Phys Rev B	2786
Adv Mater	2506
Nature	2397
Chem Mater	2363
J Phys Chem B	2165
Langmuir	2084
Phys Rev Lett	1891
J Appl Phys	1810
Macromolecules	1467
Chem Phys Lett	1407
Angew Chem Int Edit	1258
Polymer	866
Anal Chem	853
J Mater Chem	850
Thin Solid Films	843
J Phys Chem-US	830
J Chem Phys	808

The focus is on physics and chemistry, with reasonable representation from materials journals. The physics journals are a mixture of basic and applied, while the chemistry and materials journals are at the more basic end of the spectrum. There are four journals in common with those in Table 5 (Applied Physics Letters, Physical Review B, Journal of

Physical Chemistry B, Thin Solid Films). None of the most cited journals are Chinese, and the most cited journals in aggregate are more fundamental than those in Table 5.

Table 9 represents journals most cited by Chinese nanotechnology researchers. To place these numbers in perspective, an analysis was done to identify the journals cited by all nanotechnology researchers globally, emphasizing obvious Chinese journals. A study of the 2003 global nanotechnology literature retrieved over 21000 articles on nanotechnology (Kostoff et al, 2006a). Over 31000 journals were referenced in these articles. The top 23 journals, and the number of times they were cited, are shown in the top section of Table 9-CH. The referenced journals with obvious Chinese names (CHIN* or SINICA in journal name) follow in the bottom section of Table 9-CH.

There were 206 Chinese journals listed for the above extraction criteria. Most had one or two citations. Only those Chinese journals with ten or more citations are shown. There are a handful of Chinese journals that appear significant, and even these have two orders of magnitude less citations than the leading international journals. Even though China's research article productivity was second to that of the USA (Kostoff et al, 2006a), most of its journals were receiving negligible numbers of relative citations.

Table 9-CH – Most Cited Journals by Global Nanotechnology Community

ALL JOURNALS	***#CITES***
Phys Rev B	27936
Appl Phys Lett	27281
Phys Rev Lett	20000
J Am Chem Soc	17127
Science	16154
J Appl Phys	13620
Nature	13429
Langmuir	13280
J Phys Chem B	10038
Chem Mater	8415
J Chem Phys	7956
Macromolecules	7683
Adv Mater	7623
J Phys Chem-Us	6188
Chem Phys Lett	6133
Thin Solid Films	4804
Angew Chem Int Edit	4537
J Electrochem Soc	4501
Surf Sci	4024
Anal Chem	3608
Inorg Chem	3188
J Am Ceram Soc	3141
J Mater Res	3000
CHINESE JOURNALS	***# CITES***
Chem J Chinese U	433
Chinese Phys Lett	256

Acta Chim Sinica	145
Chinese Sci Bull	95
Chin J Inorg Chem	85
Acta Phys Sinica	61
Chinese J Chem	47
Chinese Phys	42
Sci China Ser B	40
Chinese J Polym Sci	40
Chinese Chem Lett	38
Chin J Lumin	30
Chinese J Org Chem	28
Chinese J Catal+	24
Chinese J Anal Chem	23
J Chin Chem Soc-Taip	20
Chin J Struct Chem	17
Sci China Ser A	16
Chinese J Appl Chem	16
Chem Res Chinese U	16
Chinese J Inorg Chem	15
Acta Opt Sinica	15
Chin J Mat Res	13
Chin J Appl Chem	11
Chinese J Struc Chem	10

4.3.2.5.3. Most Cited Documents

Table 10 – Most Cited Nanotechnology Documents

DOCUMENT	TIMES CITED	TOTAL SCI
Pan ZW, 2001, Science, V291, P1947	125	861
Nanobelts Of Semiconducting Oxides		
Iijima S, 1991, Nature, V354, P56	121	4666
Helical Microtubules Of Graphitic Carbon		
Huang MH, 2001, Science, V292, P1897	102	944
Room-Temperature Ultraviolet Nanowire Nanolasers		
Xia YN, 2003, Adv Mater, V15, P353	91	556
One-Dimensional Nanostructures: Synthesis, Characterization, And Applications		
Morales AM, 1998, Science, V279, P208	77	1007
A Laser Ablation Method For The Synthesis Of Crystalline Semiconductor Nanowires		
Hu JT, 1999, Accounts Chem Res, V32, P435	76	679
Chemistry And Physics In One Dimension: Synthesis And Properties Of Nanowires And Nanotubes		
Alivisatos AP, 1996, Science, V271, P933	74	1943
Semiconductor Clusters, Nanocrystals, And Quantum Dots		
Hoffmann MR, 1995, Chem Rev, V95, P69	53	2080

Environmental Applications Of Semiconductor Photocatalysis		
Sun YG, 2002, Science, V298, P2176	43	289
Shape-Controlled Synthesis Of Gold And Silver Nanoparticles		
Martin CR, 1994, Science, V266, P1961	41	1071
Nanomaterials - A Membrane-Based Synthetic Approach		
Decher G, 1997, Science, V277, P1232	41	1645
Fuzzy Nanoassemblies: Toward Layered Polymeric Multicomposites		
Kresge CT, 1992, Nature, V359, P710	41	4536
Ordered Mesoporous Molecular-Sieves Synthesized By A Liquid-Crystal Template Mechanism		
Peng XG, 2000, Nature, V404, P59	40	603
Shape Control Of Cdse Nanocrystals		
Huang Mh, 2001, Adv Mater, V13, P113	35	442
Catalytic Growth Of Zinc Oxide Nanowires By Vapor Transport		
Vanheusden K, 1996, J Appl Phys, V79, P7983	34	416
Mechanisms Behind Green Photoluminescence In Zno Phosphor Powders		
Oliver WC, 1992, J Mater Res, V7, P1564	34	2366
An Improved Technique For Determining Hardness And Elastic-Modulus Using Load And Displacement Sensing Indentation Experiments		
Han WQ, 1997, Science, V277, P1287	34	585
Synthesis Of Gallium Nitride Nanorods Through A Carbon Nanotube-Confined Reaction		
Treacy MMJ, 1996, Nature, V381, P678	32	835
Exceptionally High Young's Modulus Observed For Individual Carbon Nanotubes		
Murray CB, 1993, J Am Chem Soc, V115, P8706	32	1617
Synthesis And Characterization Of Nearly Monodisperse Cde (E = S, Se, Te) Semiconductor Nanocrystallites		

In Table ES10, the full or abbreviated document title is in '**bold**', following each citation. Two citation numbers are listed for each document. The first (TimesCited) is the citations from the retrieved papers only. These can be viewed as Nanotechnology-specific citations. The second (Total SCI) is the total citations received by the paper as listed in the SCI. The latter cover all succeeding years from the document publication date, and all disciplines.

Essentially, all the most cited nanotechnology documents were published in the last decade. Most of these documents focus on specific material geometries, nanostructure synthesis, specific applications, and methods for evaluating engineering material properties. The fundamental documents on electronic properties, computational approaches, and crystal structure, identified in a broader study of nanotechnology seminal papers (Kostoff et al, 2006a) do not appear in the above list of China's nanotechnology most cited documents. The present references reflect nanotechnology, as opposed to nanoscience, and are in line with the impression of the very applied nature of Chinese

research overall. The emphasis on methods for the synthesis of nanostructures shows that there is significant interest in developing the materials and structures to move into manufacturing and products.

4.3.3. <u>**Citation Comparison with India and Australia**</u>

It was desired to compare China's research with that of at least one other country. India was chosen as a country with many similar characteristics to China (large population, rapidly developing economy, rapid growth in research, etc), and was used as one basis for comparison. This comparison was published in a text mining study on India, and is reproduced here. Australia was chosen as a country located in a similar geographical region (Western Pacific), more developed nation, much smaller population, similar research output for 1998, and was used as a second basis for comparison.

Some background discussion is required to introduce the comparison approach. In evaluating research impact, there are three main criteria to consider: 'right job', 'job right', 'productivity/ progress'. 'Right job' refers to proper selection of the broadest objectives; i.e., is the right study being pursued? Addressing this metric tends to require evaluation of a country's overall investment strategy. "Job right' refers to selection of the best approaches to solving the problem to reach the desired goal. 'Productivity/ progress' refer to whether anything tangible is being accomplished.

A detailed determination of 'right job' using citation statistics would require clustering the vintage papers thematically, examining citation ranges for each cluster (theme), then assuming that those themes that had the highest citations were the 'hot' research areas. The papers that were in the 'hot' clusters would get high ratings for the 'right job' criterion. The 'job right' rating for any of the papers would be determined by its citation position within any of the clusters. However, for this China-India-Australia country application of the new comparison approach, the first two criteria are combined, and the overall citation statistics for a number of competitive research disciplines will be compared for the two countries.

For the present comparison, 1998 was chosen as the vintage year. It was of sufficient vintage that a substantial number of citations could have had time to accumulate, but sufficiently recent to relate to current research quality. Additionally, the total SCI papers for each country for 1998 were of relatively similar magnitude (India, 16228 research articles; Australia, 20185 research articles; China, 18830 research articles). Equal numbers of records for India, China, and Australia (3500) were downloaded from the SCI. Phrases and their frequencies were extracted from each country's download. China's and India's phrases were combined for the India study, and China's and Australia's phrases were combined separately for the present study. Identical phrases were grouped, and their ratios of frequencies were computed.

It was desired to select phrases representing important technical disciplines with similar levels of emphasis, and since the total published records for each country for 1998 in SCI were within about ten percent, a factor of about two difference in phrase frequency for a

technical discipline was viewed as the outer bound of similar emphasis. Thus, those phrases with both high frequencies of occurrence and frequency ratios within a factor of two were extracted, and examined.

For the China-India comparison, different phrases were chosen to represent the four major research categories: Physical Sciences, Environmental/ Agricultural Sciences, Life Sciences, and Materials Sciences. Ordinarily, Engineering Sciences is used rather than Materials Sciences, but there were insufficient phrases with adequate frequencies to represent Engineering Sciences, so Materials Sciences was used instead.

For the China-Australia comparison, different phrases were chosen to represent the four major research categories: Physical Sciences, Environmental/ Agricultural Sciences, Life Sciences, and Engineering Sciences.

Each phrase could be perceived as representing a specific technical discipline within one of the four broader categories defined above. Each phrase was used as a query, and inserted in the SCI search engine for 1998. The total SCI citations for the retrieved records for each country for each phrase from 1998-mid 2005 were tabulated and analyzed. The results for the China-India comparison are shown in Table 11, and the results for the China-Australia comparison are shown on Table 12.

Table 11 –China-India Citation Comparison

TOPIC 1998 RECORDS	INDIA RECORDS RETRIEVED	INDIA CITES TOP TEN-MED	CHINA RECORDS RETRIEVED	CHINA CITES TOP TEN-MED	WINNER
PHYSICAL SCIENCES					
Crystal*	1096	68	1923	96	Chi+
Film*	665	50	1319	58	Chi
Oxidation	555	37	501	47	Chi +
Catalyst Or Catalysis Or Catalytic	468	45	615	67	Chi ++
Algorithm*	322	33	505	36	Even
Nuclear	310	35	365	48	Chi +
Laser*	301	30	680	77	Chi ++
Network*	290	28	434	54	Chi ++
Thermodynamic*	269	43	326	48	Even
Dielectric*	240	25	199	50	Chi ++
Computer*	229	24	336	41	Chi+
Magnetic Field*	211	44	273	33	Ind +
Neutron*	160	41	166	43	Even
Spectromet*	134	20	317	39	Chi ++

Sensor Or Sensors Or Sensing	134	23	244	28	Chi +
Acoustic*	102	13	119	17	Chi
Reaction*	1519	66	1997	97	Chi+
Molecular	871	65	1244	114	Chi++
Chemical*	923	46	1033	64	Chi+
Diffraction	404	42	881	56	Chi+

ENVIRONMENTAL/ AGRICULTURAL SCIENCES					
Soil*	449	24	177	55	Chi ++
Rice	208	17	136	28	Chi ++
Wheat	102	21	206	19	Even
Atmospher*	266	50	250	51	Even
Sea	147	27	153	34	Chi
River*	103	17	103	33	Chi++
Sediment*	171	22	183	43	Chi++
Ocean*	125	32	87	38	Chi
Climat*	122	21	109	52	Chi++
Maize	84	17	49	18	Even

MATERIALS SCIENCES					
Alloy*	359	27	848	47	Chi ++
Composites	161	23	282	35	Chi +
Materials	467	39	618	61	Chi+
Metals Or Metallic	343	49	363	52	Even
Stainless Steel*	79	10	69	16	Chi+
Polymer*	711	44	1023	100	Chi++
Copolymer*	157	18	286	35	Chi++
Ferromagnetic	66	29	111	19	Ind+
Silicon	187	18	411	73	Chi++
Doped	226	43	321	28	Ind+

LIFE SCIENCES					
Enzyme*	650	42	374	70	Chi ++

Gene Or Genes Or Genetic Or Genetics	607	75	815	135	Chi ++
Antibod*	292	32	247	76	Chi ++
Cancer	199	24	257	76	Chi ++
Biolog*	314	32	271	45	Chi+
Protein*	993	105	878	108	Even
Disease*	552	60	357	146	Chi++
Blood	382	40	347	125	Chi++
Liver	253	29	223	52	Chi++
Bacter*	310	30	152	48	Chi+

Before discussing the findings, the philosophy behind Table 11 will be presented. There are a number of different metrics that could be selected for citation comparisons between the two countries. Average citations, median citations, citation distributions based on the total retrievals or a portion of the retrievals would all be candidates. However, given the nature of research, where many times only a modest fraction of projects will achieve their initial objectives, it is most important to identify those projects that generated substantial payoff. This suggests emphasis on the top layer of performing projects. This layer could be a fixed number (e.g., top ten) or a percentage of the total (e.g., top 1%). The Finland study we are presently conducting used both, and the relative standings remained the same.

Thus, the citation performance of the ten most cited papers for each technology for each country was compared. Initially, both the median citations and the citations of the two highest papers were used as metrics, to obtain multiple perspectives for comparison. However, in many cases the most cited paper was an outlier, and included authors from other (more technologically advanced) countries (especially in India's case). Since the contribution of the authors from other countries to the quality of the target paper was unknown, it was believe that giving full weight to the outliers' citations to either India or China would distort the results. All the top ten papers were retained for computing the median, reflecting the reality that India or China did play some role in the outliers' quality, and the median of the top ten was the final metric employed.

China-India Comparison Discussion

Now, the findings in Table 11 will be addressed. The first column in Table 11 is the query phrase, including variants in some cases. The second column is the number of 1998 India records retrieved for the query phrase, and the fourth column is the number of 1998 China records retrieved for the query phrase. The third column is the median citations of the ten most cited Indian papers, while the fifth column contains the same type of information for China papers. The sixth column is the citation 'winner' in the technical discipline examined, with the pluses (+) denoting the strength of the lead. The

patterns of winners in the different broad categories are examined, and judgments about leadership in each of the four major categories are made.

The phrases (technologies) are grouped by major category. The first group is Physical Sciences. Out of twenty phrases examined, representing diverse areas of Physical Sciences, China was a clear winner in fifteen, India led in one, and four were viewed as even. Clearly, China is the leader in Physical Sciences, based on top ten median numbers of citations.

The second group is Environmental Sciences. Out of ten phrases examined, China was the clear leader in seven, and three were considered even. Clearly, China is the leader in Environmental/ Agricultural Sciences.

The third group is Material Sciences. Out of ten phrases examined, China was the clear leader in seven, India was the clear leader in two, and one was considered even. Clearly, China is the leader in Material Sciences.

The fourth group is Life Sciences. Out of ten phrases examined, China was the clear leader in nine, and one was considered even. Clearly, China is the leader in Life Sciences.

Thus, China was the clear leader in each major category, although there were (isolated) instances where India led in a sub-technology area. It should be re-emphasized that this citation comparison did not examine relative investment strategies. It focused only on technical areas that had similar magnitudes of investment. It should also be emphasized that there can be many reasons why an article receives or does not receive citations (Kostoff, 1998b). These include intrinsic quality, research fundamentality (more fundamental articles receive, on average, more citations), and journal visibility. To identify which of these causation factors is operable, samples of articles would have to be retrieved, and each article examined in detail. Such an in-depth analysis was beyond the scope of the present study.

China-Australia Comparison

Table 12 –China-Australia Citation Comparison

TOPIC 1998 RECORDS	AUSTRALIA RECORDS RETRIEVED	AUSTRALIA CITES TEN-MED	CHINA RECORDS RETRIEVED	CHINA CITES TEN-MED	WINNER
PHYSICAL SCIENCES					
Chromatograph*	356	70	365	34	Aus++
Conductivity	120	39	297	33	Aus
Electronic	188	62	505	29	Aus++
Electrophoresis	179	72	169	35	Aus++
Finite Element*	152	28	226	26	Aus
Gravity	92	29	75	23	Aus
Isotope*	177	77	160	45	Aus+

Magnetic Field*	154	39	273	33	Aus
Mechanical	333	66	510	51	Aus+
Microscopy	458	111	726	56	Aus++
Molecular Dynamics	49	42	82	20	Aus++
Nonlinear Or Non-Linear	404	84	769	49	AUS+
Photon*	147	59	186	54	Aus
Polymer	212	58	523	50	Aus
Spectromet*	265	70	317	40	Aus++
Star Or Stars	170	98	97	35	Aus++
Superconduct*	116	32	283	32	Tie
Ligand*	419	208	475	84	Aus++

ENVIRONMENTAL/ AGRICULTURAL SCIENCES					
Climat*	282	99	109	53	Aus++
Earthquake*	18	22	31	9	Aus++
Floral	32	24	14	9	Aus++
Geochemi*	122	56	86	43	Aus+
Irrigation	57	21	17	8	Aus++
Ocean*	282	116	87	38	Aus++
Rock*	394	82	220	68	Aus+
Sea	338	94	153	34	Aus++
Seawater	55	45	24	12	Aus++
Sediment*	383	66	183	44	Aus+
Seedling*	139	38	58	21	Aus++
Tectonic	106	62	59	47	Aus+
Tomato*	41	37	14	14	Aus++
Volcan*	109	55	42	41	Aus+
Wheat	249	57	102	22	Aus++

ENGINEERING SCIENCES					
Aircraft	30	10	20	3	Aus++
Buckling	35	11	45	11	Tie
Engine*	191	50	212	20	Aus++
Heat Treatment	31	17	97	17	Tie
Sinter*	47	23	122	19	Aus
Software	133	61	74	11	Aus++
Steel*	146	30	285	19	Aus+
Wastewater*	32	16	22	11	Aus+
Weld*	41	12	52	9	Aus
Iron	267	88	323	44	Aus++
Metal*	737	102	1359	98	Aus

LIFE SCIENCES					

Antibod*	738	238	247	77	Aus++
Arterial	188	77	55	29	Aus++
Blood	968	181	347	127	Aus+
Cancer*	607	185	270	83	Aus++
Chromosome	253	205	107	52	Aus++
Clone*	272	123	168	71	Aus+
Dna	887	215	538	81	Aus++
Enzyme*	612	238	374	72	Aus++
Gene Or Genes Or Genetic	2001	347	811	137	AUS++
Liver*	352	129	226	52	Aus++
Lymphocyte*	347	191	92	47	Aus++
Peptide*	440	124	192	66	Aus++
Polymerase	319	93	140	73	Aus+
Protein*	1962	329	878	110	Aus++
Tissue*	999	183	370	86	Aus++
Tumor*	411	187	314	75	Aus++

China-Australia Comparison Discussion

Now, the findings in Table 12 will be addressed. The first column in Table 12 is the query phrase, including variants in some cases. The second column is the number of 1998 Australia records retrieved for the query phrase, and the fourth column is the number of 1998 China records retrieved for the query phrase. The third column is the median citations of the ten most cited Australian papers, while the fifth column contains the same type of information for China papers. The sixth column is the citation 'winner' in the technical discipline examined, with the pluses (+) denoting the strength of the lead. The patterns of winners in the different broad categories are examined, and judgments about leadership in each of the four major categories are made.

The phrases (technologies) are grouped by major category. The first group is Physical Sciences. Out of eighteen phrases examined, representing diverse areas of physical sciences, Australia was a clear winner in eleven, a close winner in six, and tied with China in one. Australia is clearly the leader in Physical Sciences, based on top ten median numbers of citations.

The second group is Environmental/Agricultural Sciences. Out of fifteen phrases examined, Australia was the clear leader in all fifteen. Australia was an obvious winner over China in Environmental/Agricultural Sciences.

The third group is Engineering Sciences. Out of eleven phrases examined, Australia was the clear leader in six, a close leader in three, and was tied with China in two. Although Australia is the winner in Engineering Sciences, China's foucus on engineering and applied sciences can be seen, even compared to a first world country such as Australia.

The fourth group is Life Sciences. Out of sixteen phrases examined, Australia was the clear leader in all sixteen. This result is not only expected, but is further evidence that

China is currently putting relatively more research effort into engineering and applied sciences than any other category, especially Life Sciences.

Thus, Australia was the clear leader in each major category, although there were (isolated) instances where China was tied in a sub-technology area. It should be re-emphasized that this comparison did not examine relative investment strategies. It focused only on technical areas that had similar magnitudes of investment.

4.4 Taxonomies

Taxonomies, as used in the present document, are technical categories structured hierarchically. Two types of taxonomies are presented, manual and statistical. The manual taxonomies require mainly hand-classification of Abstracts, journals, and keywords into categories, whereas the statistical approaches use more computer-based pre-classification. In both approaches, strong human input is required for final categorization.

4.4.1 Manual

A manual taxonomy was generated for a random ten percent sample from the full database of 2002 records. The taxonomy, and additional attributes assigned to each record, included: (1) manually reading the selected abstracts and classifying them with a Theme and Sub-Theme from the DTIC taxonomy (see Appendix 5); (2) counting the number of words for each selected abstract; (3) counting the number of Keywords for each selected abstract; (4) counting the number of Author Keywords for each selected abstract; (5) assigning a number to each selected record to represent a level of clarity of the abstract to assign to a particular theme and sub-theme; and (6) classifying the type of research of each abstract (e.g. 6.1, 6.2, or 6.3 for Basic Research, Applied Research, or Advance Technology Development, respectively). An indepth analysis of the correlation between the word counts and clarity was also performed. A complete spreadsheet of all the above mentioned records is contained in Appendix 11.

4.4.1.1 Full Abstract

A sample consisting of every tenth Abstract was extracted from the full 2002 SCI database, read, and categorized. The taxonomy that the Defense Technical Information Center (DTIC) uses to classify its archival reports/ records, also known as the DTIC taxonomy (See Appendix 5), was used for classification. Only one theme and corresponding sub-theme were assigned to each Abstract. In cases where there were multiple themes and sub-themes associated with each Abstract, an attempt was made to assign the most appropriate one. The Themes ranked in order of number of Abstracts per theme are shown below in Table 13. A complete listing of the Themes and Sub-Themes is contained in Appendix 11.

Table 13. Manual Classification of Abstract Themes based on DTIC Taxonomy

# ABS per THEME	% ABS per THEME	THEME
195	26.2	BIOLOGICAL & MEDICAL SCIENCES
165	22.2	CHEMISTRY
120	16.1	PHYSICS
76	10.2	MATERIALS
71	9.5	MATHEMATICAL & COMPUTER SCIENCES
21	2.8	EARTH SCIENCES & OCEANOGRAPHY
19	2.6	ELECTROTECHNOLOGY & FLUIDICS
16	2.2	ENVIRONMENTAL POLLUTION & CONTROL
12	1.6	MECHANICAL, INDUSTRIAL, CIVIL & MARINE ENGINEERING
7	0.9	AGRICULTURE
7	0.9	NAVIGATION, DETECTION & COUNTERMEASURES
6	0.8	ASTRONOMY & ASTROPHYSICS
6	0.8	NUCLEAR SCIENCE & TECHNOLOGY
5	0.7	POWER PRODUCTION & ENERGY CONVERSION (NON-PROPULSIVE)
5	0.7	PROPULSION, ENGINES & FUELS
3	0.4	ATMOSPHERIC SCIENCES
3	0.4	BEHAVIORAL & SOCIAL SCIENCES
3	0.4	COMMNICATIONS
2	0.3	BIOTECHNOLOGY
2	0.3	TEST EQUIPMENT, RESEAERCH FACILITIES & REPROGRAPHY
744		Total Abstracts Manually Classified

4.4.1.2 Word Count

Word counts were performed on the sample Abstracts manually categorized for number of keywords, author keywords, and number of abstract words. The results for each record are listed in Appendix 11. There are strong differences in the numbers of Abstract words among different thematic areas. Some thematic areas with high median numbers of Abstract words include:

- **Biological and Medical Sciences** (Abs Word Avg: 174)
    - Toxicology (Abs Word Avg: 159)
    - Medicine and Medical Research (Abs Word Avg: 204)
    - Anatomy and Physiology (Abs Word Avg: 197)
- **Agriculture** (Abs Word Avg: 264)
    - Agricultural Engineering (Abs Word Avg: 264)
    - Agronomy, Horticulture, and Aquaculture (Abs Word Avg: 270)
    - Animal Husbandry and Veterinary Medicine (Abs Word Avg: 201)

- **Earth Sciences and Oceanography** (Abs Word Avg: 166)
  - Soil Mechanisms (Abs Word Avg: 175)
  - Mining Engineering (Abs Word Avg: 260)
  - Geology, Geochemistry, and Mineralogy (Abs Word Avg: 160)

These areas focus on Life and Environmental Sciences. Many of the journals in these areas, especially those of the Life and related sciences, require Structured Abstracts, which are more complete and longer, on average, than those articles in journals that do not require Structured Abstracts.

And some thematic areas with low median numbers of Abstract words include:

- **Mathematics and Computer Science** (Abs Word Avg: 96)
  - Theoretical Mathmatics (Abs Word Avg: 78)
  - Statistics and Probability (Abs Word Avg: 87)
  - Numerical Mathematics (Abs Word Avg: 91)
- **Physics** (Abs Word Avg: 95)
  - Optics (Abs Word Avg: 72)
  - Nuclear Physics and Elementary Particle Physics (Abs Word Avg: 82)
  - Atomic and Molecular Physics and Spectroscopy (Abs Word Avg: 90)
- **Chemistry** (Abs Word Avg: 114)
  - Physical Chemistry (Abs Word Avg: 112)
  - Organic Chemistry (Abs Word Avg: 136)
  - Inorganic Chemistry (Abs Word Avg: 106)

These areas focus on the Mathematical and Physical Sciences, whose journals do not require Structured Abstracts.

4.4.1.3 Clarity of Abstract

A subjective assessment of the clarity of the sample Abstracts manually categorized was performed. Clarity was based upon the ease which the Abstracts could be manually categorized with a main theme and sub-theme from the DTIC taxonomy. A scale of one to five was used for the level of clarity, with one being the hardest to assess and five being the easiest (i.e. most clear). The percentages of records receiving each of the grades are as follows; 5 (59.7%), 4 (35.5%), 3 (4.6%), 2 (0.3%), and 1 (0%). The results for each record are listed in Appendix 11. The clarity of the Abstracts correlates directly with the number of Abstract words. The more words that an Abstract contains, the clearer is the Abstract. For example, the median clarity score for the twenty highest number of word Abstracts is five, whereas the median clarity score for the twenty lowest is four.

4.4.1.4 Research Type of Abstract

Each of the sample Abstracts manually reviewed was also manually classified for the level of development (e.g. 6.1; 6.2; or 6.3; the USA military terminology for Basic

Research, Applied Research, or Advanced Technology Development, respectively). The percentage of records categorized as 6.1 was 77.8%, 6.2 was 15.9%, and 6.3 was 5%. The results for each record are listed in Appendix 11. The average clarity value for 6.3 research was 4.81/5, for 6.2 research it was 4.58/5, and for 6.1 research it was 4.52/5. In terms of the relation between number of words and level of development, the twenty highest number of word Abstracts contained one 6.3, six 6.2, and thirteen 6.1, whereas the twenty lowest contained one 6.2, and the remainder 6.1.

4.4.2 Statistical

Two generic types of statistical clustering were used, concept clustering and document clustering. In concept clustering, words or phrases are clustered based on their co-occurrence in the same text unit. In document clustering, documents are clustered based on their overall text similarity.

4.4.2.1 Concept Clustering

Two statistically-based concept clustering methods were used to develop taxonomies, factor matrix clustering and multi-link clustering. Both offer different perspectives on taxonomy category structure from the document clustering approach described later. None of the clustering approaches included here is inherently superior.

In this section, a synergistic combination of factor matrix and multi-link clustering is described that offers substantial improvement in the quality of the resultant clusters. Once the appropriate factor matrix has been generated, the factor matrix can then be used as a filter to identify the significant technical words for further analysis. Specifically, the factor matrix can complement a basic trivial word list (e.g., a list containing words that are trivial in almost all contexts, such as ‘a’, ‘the’, ‘of’, ‘and’, ‘or’, etc) to select context-dependent high technical content words for input to a clustering algorithm. The factor matrix pre-filtering will improve the cohesiveness of clustering by eliminating those words that are trivial words operationally in the application context (Kostoff, 2005e).

In addition, the present application compares the use of single words with the use of multi-word phrases for factor generation. There are positives and negatives associated with each approach. Some technical detail is lost by excluding the ordering information contained in multi-word phrases. Conversely, inclusion of all single words compensates for the elimination of some multi-word phrases due to the selection algorithm of the Natural Language Processor. It was desired to examine the trade-off of single words vs. multi-word phrases for factor generation.

4.4.2.1.1 Factor Matrix Clustering

4.4.2.1.1.1 Factor Matrix Clustering Approach

Figure 1 is a truncated five factor matrix, shown for illustrative purposes only.

Figure 1. Truncated Five Factor Matrix

FACTOR	1	2	3	4	5
plasma	-0.047	-0.261	0.012	-0.042	-0.03
velocity	0.021	-0.255	0.021	0.035	0.02
source	-0.014	-0.218	0	0.152	-0.05
flux	-0.004	-0.217	0.009	0.033	0.002
gas	0.053	-0.217	0.006	-0.012	-0.03
flow	-0.041	-0.215	0.017	0.018	-0.097
pressure	0.064	-0.215	-0.027	-0.006	-0.001
profile	0.017	-0.206	0.019	0.044	0.022
distribution	0.009	-0.203	-0.034	0.073	-0.018
mass	0.021	-0.203	-0.01	0.055	-0.043
heat	-0.009	-0.196	0.012	-0.027	0.035
density	-0.009	-0.19	0.021	0.051	0
surface	0.041	-0.176	0.093	0.008	0.031

In this illustrative factor matrix, the rows are the words/phrases and the columns are the factors. Each factor represents a technical theme. The matrix elements Mij are the factor loadings, or the contribution of word/ phrase i to the theme of factor j. In the example above, the factor loading of the first word (plasma) to the first factor is -0.047. The theme is determined by those words/ phrases that have the largest absolute values of factor loading. When the matrix elements were ordered numerically for a given factor, the factor had a positive value tail and negative value tail. For each factor, most of the time, one of the tails dominated in terms of absolute value magnitude. This dominant tail was used to determine the central theme of each factor. In those few cases where the tails were of very similar absolute value magnitude, a theme was extracted from each tail.

To generate the words/ phrases input to the factor matrix, the highest frequency high technical content words were identified. A factor analysis was performed using the TechOasis statistical package,

After the factor matrices were generated, the word factor matrix was then used for word filtering and selection. In the present study, the words in the factor matrix had to be culled to the approximately 250 allowed by the Excel-based clustering package, WINSTAT. The 250 word limit is an artifact of Excel (i.e. the maximum number of columns in an Excel Spreadsheet). Other software packages may allow more or less words to be used for clustering, but all approaches perform culling to reduce dimensionality. The filtering process presented here is applicable to any level of filtered words desired.

The factor loadings in the factor matrix were converted to absolute values. Then, a simple algorithm was used to automatically extract those high factor loading words at the tail of each factor. If word variants were on this list (e.g., singles and plurals), and their factor loadings were reasonably close (Kostoff, 2003b), they were conflated (e.g., 'agent' and 'agents' were conflated into 'agents', and their frequencies were added). A few

words were eliminated manually, based on factor loading and estimate of technical content.

4.4.2.1.1.2 Factor Matrix Clustering Results

A list of single words and a list of phrases were generated from the Abstracts using the TechOasis Natural Language Processor. For each list, 1146 high frequency high technical content items were extracted. A factor analysis words/ phrases was performed using the TechOasis statistical package. In each case, a factor matrix consisting of 40 factors resulted. Appendix 6 contains a brief description of each factor in the word factor matrix. Appendix 7 contains a brief description of each factor in the phrase factor matrix.

In the following two flat taxonomies (generated by manually assigning the factors to categories), the words in capital letters represent main themes, and the bullets underneath them are descriptions of the factors that are contained within that category. The number in front of the description is the Factor number taken from either Appendix 6 or 7.

<u>Flat Taxonomy from Appendix 6</u>

MEDICAL SCIENCE

- (1) the biological sciences of cell physiology, primarily using cells from rats.
- (6) medical studies of humans for cancer research and potential causes and risk factors.
- (27) cancer research for humans by studying the physiology of cancer cells and tumors
- (34) in vivo physiology studies of livers, tissues, and blood of mice and rats

PHYSICS

- (2) the physical properties of plasmas and gases related their flow and distribution
- (15) physical properties of spectroscopy such as emissions, spectra, absorption, fluorescence in the red, blue, and UV wavelength regions of the energy spectrum
- (18) the physical properties of quantum physics theory associated with energy such as energy states, energy levels, bonding energy, energy densities, and excitation energies
- (25) synthesizing Nuclear Magnetic Resonance (NMR) and IR imaging techniques
- (28) physical properties used to characterize lasers using Nd crystals, such as optical properties, wavelengths, frequency, power, and pulse generation
- (36) spectroscopic techniques such as X-ray Diffraction (XRD), Transmission Electron Microscopy (TEM) used in morphology studies
- (38) characterizing image processing algorithms feature recognition and extraction
- (39) the properties of nuclear physics

CHEMISTRY

- (3) atomic physics, specifically the interactions and bonding on atoms, molecules, ligands, crystals, primarily those of hydrogen and oxygen
- (10) the synthesis and reactions of polymers, copolymers, and solvents
- (12) properties of physical chemistry such as catalysts, oxidation, reactions, and reduction of CO
- (19) the physical chemistry properties used to characterize electrodes
- (23) spectroscopy techniques such as FTIR (Fourier Transform – InfraRed), XPS, and Raman spectroscopy
- (24) properties and uses of chromatography to separate mixtures of elements
- (32) Mechanic properties of physics such as kinetics, reactions, equilibrium and diffusion

MATHEMATICS AND MODELING

- (5) the metric properties of detection such as limits, ranges, mathematical statistics, and sensitivities
- (16) applied numerical mathematics of the chemistry of rare earth elements
- (26) algorithm design for simulations of control systems engineering using neural networks and optimization techniques
- (29) linear modeling techniques for regression, correlation, and prediction
- (40) modeling and simulations of the physical properties of proteins

ENGINEERING AND MATERIALS

- (7) the physical properties of composite materials
- (9) physical properties to define crystal structures
- (11) the growth, deposition, and thickness of thin films and substrates, primarily with the material Si
- (17) the change in physical properties of material composition of grains due to changes in temperature
- (14) the study of microstructures such as nanoparticles, powders using techniques like X-ray diffraction, TEM, and sol-gel
- (21) the atomic interactions of heavy ions and photoelectrons of various elements such rare earth elements and metals using X-Ray Photoelectron Spectroscopy (XPS)
- (22) the physical properties of materials science used to characterize the effects of deformation such as stress, strain, cracks, elasticity, and boundaries
- (31) the sintering and ferroelectric properties of dielectrics and ceramic materials
- (33) the material properties of aluminum microstructures
- (35) microstructures of alloy materials to include their grains and deformation
- (37) characterizing properties of crystallization and glass using Differential Scanning Calorimetry (DSC)

BIOLOGICAL SCIENCES

- (8) genetic sequencing biology
- (13) molecular biology properties associated with mRNA such as binding, affinity, and purity

- (30) Polymerase Chain Reactions (PCR) and Reverse Transcription PCR (RT-PCR) used to detect DNA

ENVIRONMENTAL SCIENCES / GEOGRAPHICAL SCIENCES
- (4) the temporal (early and late) and location (middle, upper) divisions of regions and processes (eg. Stages)
- (20) the environmental impacts on plants & soils growth, concentrations, and production

<u>Flat Taxonomy from Appendix 7</u>

MEDICAL SCIENCES
- (7) physiology studies of organs (heart, liver, kidney, lung, brain, testis), blood and tissues of rats and mice
- (8) correlating backgrounds of patients and methods to identify specific symptoms with the appropriate disease diagnosis of diseases and treatments for the patients
- (13) study of cells and proteins of rats (IL-6, Tumor Necrosis Factor-alpha (TNF-alpha), and LPS)
- (24) physiology of cells and genes and their effects on hepatocellular carcinoma (HCC)
- (30) the risks to humans of smoking tobacco based on gender, age and pregnancy
- (38) both in vivo and in vitro physiology studies of mice cells to characterize the effects of inhibitors and cytotoxicity on cell proliferation using immunohistochemical staining techniques

PHYSICS
- (3) the elemental materials (Gd, Sm, Pr, La, Nd, ER, Tb, HO, Eu) identified in proton - Nuclear Magnetic Resonance (H-1 NMR) spectra
- (5) the spectroscopic techniques such as Raman spectroscopy, X-ray photoelectron spectroscopy (XPS), and Fourier Transforms that exploit Rutherford scattering to characterize laser deposition of films and substrates that contain carbon
- (14) elemental analysis by synthesizing Nuclear Magnetic Resonance (NMR) and IR imaging techniques
- (26) spectroscopic techniques used to characterize thermal stability. These include: Differential Scanning Calorimetry (DSC), Fourier Transfor Infra Red (FTIR), Themogravimetric Analysis (TGA), and C-13 Nuclear Magnetic Resonnance (NMR)v
- (27) the detection properties used in assaying antibodies, antigens, serums, and urine which include sensitivity, specificity, mobile phase, flow rates, accuracy, and separation capabilities
- (28) spectroscopy techniques such as X-ray Diffraction (XRD), Tomographic Electron Microscopy (TEM), XPS, SEM, BET, FR-IR, and FTIR

CHEMISTRY

- (4) physical chemistry properties such as catalysts, oxidation, reactions, and activities of propylene and H2O2
- (9) characterizing the physical properties of isomers
- (11) the physical properties of TiO2 particles
- (18) the study of fuels such as methane, alcohols, ethanol, acetic acid, methanol, and ammonia which includes their release of carbon dioxide and flow rates
- (22) the physical properties of TiO2 particles
- (23) the elements used in Temperature Programmed Reduction/Reaction (TPR) experiments, such as Nitrogen, Oxygen, oxides (eg. Copper & Nitrous Oxide), Hydrogen, CH4, and Argon
- (36) spectroscopic techniques such as XPS, FTIR, TEM, and XRD to characterize the hydrolysis of elements such as hydrogen and methane

ENGINEERING AND MATERIALS

- (1) the physical properties to define crystal structures
- (6) changes in morphology and crystallization between different blends of Polypropylene (PP) fibers
- (10) the mechanical properties and strengths of composite materials
- (12) the detection characteristics of sensors using Na, Li, hydrogen peroxide, such as limits, linear range, and oxidation
- (15) the characterization of wear resistance and surface morphology of coatings and films using atomic force microscopy (AFM)
- (17) the characterization of the material properties of dielectrics and ceramics
- (19) properties used to define crystal structures
- (20) studies involving the following Transition Metal elements; Zn, Mn, Cu, Ni, Pb, CR, Mg, Ti, CO, and Cd
- (21) characterizing the morphology of aluminum and silver material nanowires using transmission electron microscopy (TEM) and X-ray Diffraction (XRD) techniques
- (32) characterizing the electrochemical behavior of electrodes (gold and ZnO) using XRD
- (33) absorbance properties of metals, such as zinc, iron, copper, nickel, and calcium
- (35) characterizing the properties and microstructures of alloys, such as grains, grain boundaries, and grain size using TEM and SEM techniques
- (37) characterizing the material properties of films and surfaces using atomic force microscopy (AFM)
- (39) TGA, DSC, and NMR techniques to characterizes swelling of glass, membranes, and hydrogels used in the Chemical Industry
- (40) material composition of solid state surfaces using CuO

BIOLOGICAL SCIENCES

- (2) the gene onotolgy of Bcl-2 associated X-proteins (BAX) and caspase-3 genes
- (16) the study of genetic defects in cells and proteins resulting from tobacco use based on assessment techniques such as immunohistochemistry and RT-PCR

- (29) the lifespan of animals based sex and weight
- (34) determining the presence of E. coli and bacteria in chitosan, supernatants, enzymes, proteins, and copolymers using techniques such as PCR, FTIR, and NMR

AGRICULTURAL AND ENVIRONMENTAL SCIENCES

- (25) plant (eg. wheat) and soil toxicity studies and their effects on roots, germination and related treatments

In Appendices 6 and 7, the phrases in parentheses represent high factor loading phrases for the factor described, and are presented in inverse order of absolute factor loading value. The decrease in factor loading values is not linear, and the theme of each factor is strongly determined by the first few words/phrases.

(In the next section, a taxonomy is generated using the multi-link hierarchical clustering approach. The factors in each case above are assigned to the appropriate categories in the taxonomy, providing good coverage and an excellent match.)

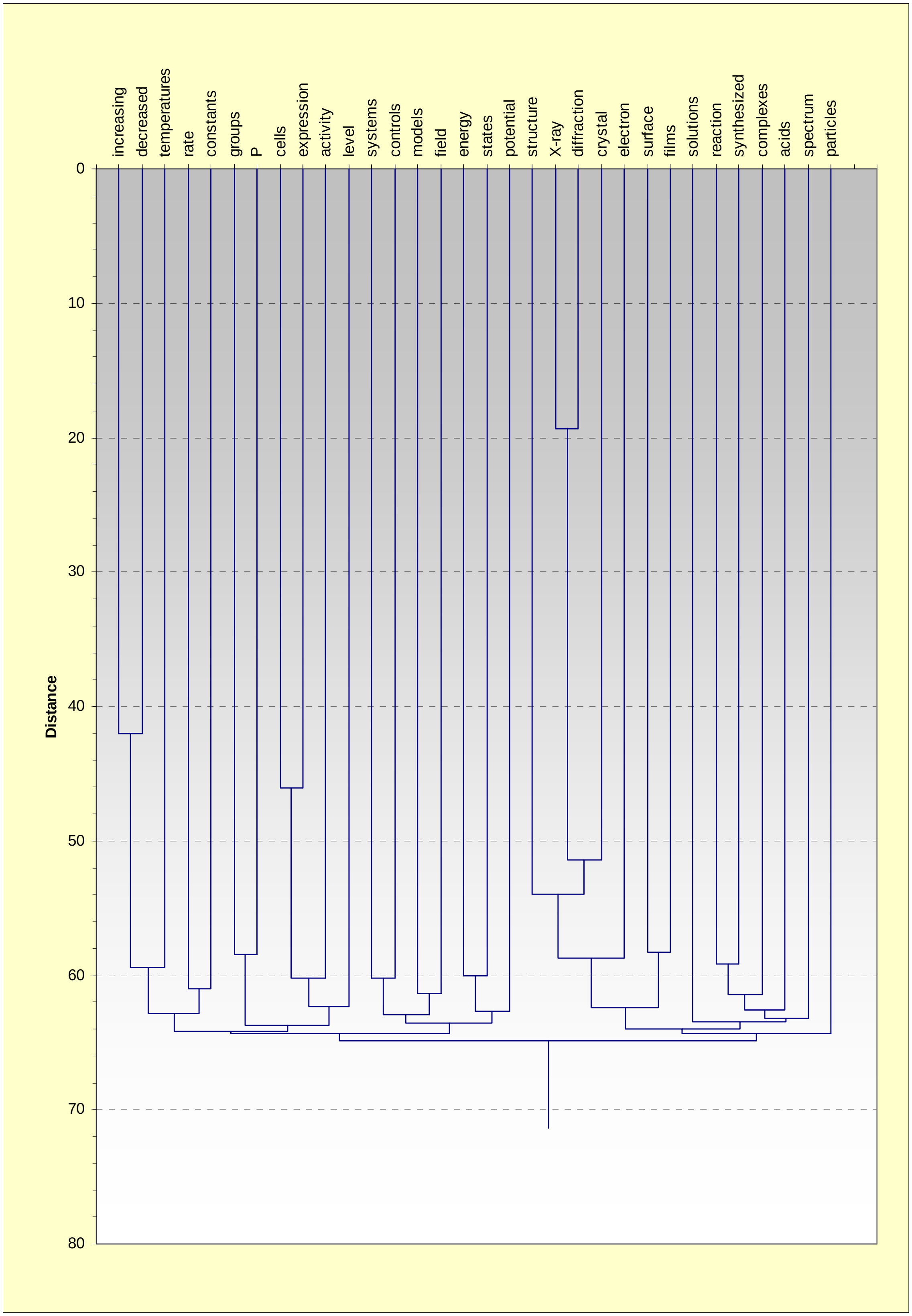
4.4.2.1.2 Multi-Link Hierarchical Word/ Phrase Clustering

4.4.2.1.2.1 Multi-Link Clustering Approach

A symmetrical co-occurrence matrix of the highest frequency high technical content words/ phrases was generated. The matrix elements were normalized using the Equivalence Index (Eij=Cij^2/Ci*Cj, where Ci is the total occurrence frequency of the ith word/ phrase, and Cj is the total occurrence frequency of the jth word/ phrase, for the matrix element ij), and a multi-link clustering analysis was performed using the WINSTAT statistical package. The Complete Linkage hierarchical aggregation method was used. A description of the final word dendrogram (a hierarchical tree-like structure), and the aggregation of its branches into a taxonomy of categories, follows in the results section.

Figure 2 is a word-based dendrogram, shown for illustrative purposes. One axis is the words, and the other axis ('distance') reflects their similarity. The lower the value of 'distance' at which words, or word groups, are linked together, the closer their relation. As an extreme case of illustration for the dendrogram, words that tend to appear as members of multi-word phrases, such as 'x-ray diffraction', appear adjacent on the dendrogram with very low values of 'distance' at their juncture. In the cluster descriptions that follow, the capitalized phrases in parentheses represent cluster boundary words for each category.

Figure 2. Word-Based Dendrogram (32 High Frequency Phrases)



4.4.2.1.2.2 Multi-Link Clustering Results

In the previous focused discipline text mining studies, the average link hierarchical aggregation clustering method was used. In those cases, a hierarchical structure could be discerned, and each level of the hierarchy (proceeding downward) described the discipline at increasingly higher levels of detail. In the present country assessment, the clusters are different technologies. A rational hierarchical aggregation at the highest level should not be expected.

A description of the final word and phrase dendrograms (a hierarchical tree-like structure), and the aggregation of their branches into a taxonomy of categories, follows. See Appendices 8A and 8C for the respective word and phrase dendrograms, and Appendices 8B and 8D for the respective word and phrase taxonomies based on a hierarchical aggregation. One axis is the words, and the other axis ('distance') reflects their similarity. The lower the value of 'distance' at which words, or word groups, are linked together, the closer their relation.

In contradistinction to past topical studies, complete link clustering was used rather than average link clustering. Because the technologies are very diverse, a hierarchical clustering is not applicable. The top level clusters form a flat set. Some of the clusters have a distinct hierarchical structure into sub-clusters, where a technology area can be divided into its specific sub-technologies. In the cluster descriptions that follow, the capitalized phrases in parentheses represent cluster boundary words for each category. Appendix 4E contains the taxonomies used for comparative purposes with other classification methods used in this study such as the Greedy String Tiling (GST) clustering. This taxonomy was derived from a flat set vice a hierarchal aggregation, which was found to break out themes and subthemes in a more representative manner. Hence, there are no cluster boundary words denoted for each category, as many themes crossed boundaries. This was derived with some consideration from the analysis of the other clustering techniques from the same original data set (SCI) used in this study, such as the CLUTO Partitional Clustering algorithm.

The next section describes the clusters at different levels of the hierarchy, for clusters based on words and based on phrases from the 2002 SCI data set.

4.4.2.1.2.2.1 Word Clustering Results

The 253 words in the dendrogram are grouped into top level clusters. At this level, four broad topics can be discerned. These include material sciences, environmental sciences, organic chemistry, and clinical medical research. Each of these highest level clusters will be divided into smaller clusters, as follows.

1) Material Science
There are two main groupings: inorganic chemistry (ABSORPTION – SPACE); and powders, thin films, substrates, & glass (GROUPS – THERMAL).

2) Environmental & Material Sciences
There are two main groupings: ceramic composites & nanoparticles (TEMPERATURE – NANOPARTICLES); and environmental sciences (FIELD – CONTROLS).

3) Organic Chemistry
There are two main groupings: copolymers (SYSTEMS – POLYMERIZATION); and polymers (POLYMERS – CHAINS).

4) Clinical Medical Research
There are two main groupings: biological mechanisms or cancer and diseases (REACTION – CELLS); and medical treatments (BLOOD – INCREASING).

See Figure-3 below for the Multilink-Word taxonomy, levels 0-4.

Figure 3. Multi-link Word Taxonomy (SCI, Levels 0-4)

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
Science (Biological, Environmental, & Material)	Biological Sciences	Clinical Medical Research	Medical treatments using different concentrations of plasma & blood	Changes in Concentrations, Treatments & Rates
				Blood & Plasma
			Biological mechanisms of cancer and diseases	Biologic studies of cancer and diseases
				Reactions
		Organic Chemistry	Polymers	Polymer Chains
				Polymer Catalysts
			Copolymers	Copolymer & Solvents
				Systems
	Environmental & Material Sciences	Environmental Sciences & Material Science (Ceramic Composites & Nanoparticles)	Environmental Sciences	Epidemiology, Agronomy, & Physics
				Detection & Characterization of Trace amounts of substances
			Ceramic Composites & Nanoparticles	Properties of ceramic composites, nanoparticles, & alloy microstructures
				Porous templates & pore temperatures
		Material Science (Powders, Thin Films, Substrates, & Glass)	Powders, Thin Films, Substrates, & Glass	Characterization of Powders, Thin Films, and Substrates
				Characterization of Glass
			Inorganic Chemistry	Chemistry of atoms, molecules, ligands, & compounds
				Absorption

A more representative flat-based taxonomy of themes and sub-themes is depicted in Appendix 8E. There are six main themes; Biological & Medical Sciences, Chemistry, Computer Science & Systems, Environmental Sciences, Materials Science, and Physics & Mathematics. There associated sub-themes are as follows:

1) Biological & Medical Sciences
There are four sub-themes: Cancer & Disease Research; Clinical Medical Treatments; Epidemiology; and Genetics.

2) Chemistry
There are four sub-themes: Inorganic Chemistry; Organic Chemistry; Physical Chemistry; and Polymer & Copolymer Chemistry.

3) Computer Sciences & Systems
There are four sub-themes: Algorithms; Modeling & Simulation; Signal & Image Processing; and Systems.

4) Environmental Sciences
There are two sub-themes: Agronomy; and Ecology.

5) Materials Science
There are six sub-themes: Ceramics & Composites; Crystals; Glass; Nanoparticles & Microstructures; Powders; and Thin Films & Substrates.

6) Physics & Mathematics
There are four sub-themes: General Physics; Lasers & Optics; Mathematics; and Spectroscopy.

4.4.2.2 Document Clustering

Document clustering is the grouping of similar documents into thematic categories. Different approaches exist (e.g., Willett, 1988; Rasmussen, 1992; Cutting, 1992; Guha, 1998; Hearst, 1998; Zamir, 1998; Karypis, 1999; Steinbach, 2000). Two approaches were examined in this report: Greedy String Tiling, and Partitional Clustering.

4.4.2.2.1 Greedy String Tiling

4.4.2.2.1.1 Greedy String Tiling Approach

The approach presented in this section is based on a Greedy String Tiling (GST) text matching algorithm (Wise, 1992; Prechelt et al, 2002). It is described in some detail in Appendix 9A. Basically, GST clustering forms groups of documents based on the cumulative sum of shared strings of words. Each group is termed a cluster, and the number of records in each cluster, and the highest frequency technical keywords in each cluster, are two outputs central to this analysis.

4.4.2.2.1.2 Greedy String Tiling Results

A seven percent similarity threshold produced a total of 908 clusters. Ninety-three percent of the clusters contained nineteen abstracts or less. The 68 largest clusters, containing, 3329 Abstracts (i.e. 42.8% of the 7780 original abstracts), were extracted, and are listed in Appendix 9B. The main keywords from each cluster (and their frequencies of occurrence within the cluster) are shown in parentheses after the cluster number, and the number of records (number of abstracts in this case) in each cluster is shown in brackets next to the cluster number. The keywords are arranged in frequency of appearance, in descending order. Three levels of filtering were used to obtain the main keywords shown below. First, a trivial word list (e.g., of, the, on, etc) was applied to the raw data. Second, only the highest frequency words for each cluster were retained. Third, a manual filtering was performed on the thirty highest words. The themes of each cluster are defined by the keywords shown. The taxonomy based on these themes follows the theme keyword listings.

The taxonomy defined by the word and phrase clustering algorithms includes all the clusters in the document clustering. Each cluster was assigned to the most appropriate category in the taxonomy defined by the WINSTAT-generated dendrogram of the last section, based on the theme suggested by the highest frequency technical keywords. The number of records in each taxonomy category from all the clusters in the category was calculated, and is shown in Table 14.

Table 14. Assignment of GST Clusters to Multi-Link (Word) Main Themes (Categories)

CLUSTER #	# OF RECORDS IN CLUSTER	MULTI-LINK (WORD) THEMES					
		BIO & MED SCI	CHEM	COMP SCI & SYS	ENV SCI	MAT'L SCI	PHYS & MATH
1	234					234	
2	230		230				
3	190					190	
4	119		119				
5	117					117	
6	112		112				
7	111	111					
8	94			94			
9	86			86			
10	86					86	
11	76		76				
12	74						74
13	68						68
14	66	66					
15	66			66			
16	64						64
17	62		62				
18	57					57	
19	49						49
20	46					46	
21	45			45			
22	43					43	
23	41		41				
24	38	38					
25	38					38	
26	37					37	
27	34					34	
28	33		33				
29	33		33				
30	33					33	
31	32					32	
32	31					31	
33	31		31				
34	30		30				
35	29					29	
36	29					29	
37	29	29					
38	29		29				
39	28					28	
40	28		28				
41	28		28				
42	27		27				
43	27					27	
44	27	27					
45	26		26				
46	26					26	
47	26	26					
48	26						26

49	26						26
50	25	25					
51	24						24
52	24		24				
53	24			24			
54	24		24				
55	23				23		
56	23					23	
57	21		21				
58	21					21	
59	21						21
60	21	21					
61	21						21
62	20					20	
63	20						20
64	20						20
65	20		20				
66	20						20
67	20		20				
68	20						20
SUM	**3329**	**343**	**1014**	**315**	**23**	**1181**	**453**
SUM (NORM)		**0.103**	**0.305**	**0.095**	**0.007**	**0.354**	**0.136**

4.4.2.2.3 Partitional Clustering

4.4.2.2.3.1 Partitional Clustering Approach

The approach presented in this section is based on a partitional clustering algorithm (Zhao and Karypis, 2005; Karypis, 2005) contained within a software package named CLUTO. Most of CLUTO's clustering algorithms treat the clustering problem as an optimization process that seeks to maximize or minimize a particular clustering criterion function defined either globally or locally over the entire clustering solution space. CLUTO uses a randomized incremental optimization algorithm that is greedy in nature, and has low computational requirements. Appendix 2 describes the partitional clustering approach in more detail.

4.4.2.2.3.2 Partitional Clustering Results

In partitional clustering, the number of clusters desired is input, and all documents in the database are included in those clusters. The results for the cases run with different number of clusters and data sets are all listed in Appendices 10B, 10D, & 10F. The main keywords from each cluster (and the percentage of the cluster theme for which they account) are shown in parentheses after the cluster number, and the number of records in each cluster is shown in parenthesis before the cluster number. The keywords are arranged in theme contribution, in descending order. The procedure was performed for the following data sets; SCI (7780 of 41,953 records from 2002) with 40 clusters, the Engineering Compendex (9949 of 86,479 records from 2000 - 2003) with 256 clusters, and the SCI (34834 records from 2005).

Three levels of filtering were used to obtain the main keywords shown in the Appendices. First, a trivial word list (e.g., of, then, on, etc) was applied to the raw data. Second, only the highest frequency words for each cluster were retained. Third, a manual filtering was

performed on the thirty highest words. The themes of each cluster (in brief narrative form) follow the keywords shown. The clusters were aggregated into a hierarchical taxonomy using a hierarchical tree generated by the CLUTO software. The detailed taxonomies are shown in Appendices 10C, 10E, & 10G, where the first number in the each cell represents that particular cell cluster identification, and the second number in the parenthesis represents the number of records (abstracts) associated with that cluster. The taxonomy descriptions in each cell were derived manually starting from the elemental clusters at the lowest hierarchical level and working up to the highest level. They were based on the key words in that particular cluster and a review of many of the abstracts associated with the particular cluster to gain a better understanding of the context of the cluster keywords. The categories in the taxonomy levels, and the number of documents in each category, are described as follows.

4.4.2.2.3.2.1 Science Citation Index (40 Clusters, year 2002)

The 7780 records from this data set were run through the CLUTO algorithm using 40 clusters. This resulted in generating 78 total clusters aggregated into the hierarchical tree with eight levels based on the 40 elemental clusters. In Figure 4 below, the columns represent the taxonomy levels. The top four of the eight levels are depicted in this taxonomy. The highest level (Level-1 with two categories) is the first column, and the lowest level shown (Level-4 with sixteen categories) is the last column. The numbers in parentheses represent the number of records assigned to the category. The numbers in brackets represent the percentage of the number of records in that category to the total number of records.

Figure 4. Partitional Document Clustering (CLUTO) Taxonomy Levels 1-4 (SCI, 40 Clusters, year 2002)

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
(1711) - Bio-Medical Sciences [22%]	(865) - Laboratory Medical Research [11.1%]	(501) - Animal & Human Physiology [6.4%]	(217) - Animal Physiology [2.8%]
			(284) - Human Physiology [3.7%]
		(364) - Genetic & Molecular Biology [4.7%]	(165) - Molecular Biology [2.1%]
			(199) - Genetics [2.6%]
	(846) - Clinical Medicine [10.9%]	(389) - Clinical Medicine [5.0%]	(210) - Clinical Chronic Disease Treatment [2.7%]
			(179) - Cancer Risk Factors [2.3%]
		(457) - Geology & Environmental Sciences [5.9%]	(210) - Geology of Chinese Regions [2.7%]
			(247) - Seasonal & climate induced changes on environment [3.2%]
(6069) - Physical & Engineering Sciences [78%]	(2544) - Physics, Mechanics & Mathematics [32.7%]	(1180) - Algorithms & Mathematics [15.2%]	(713) - Algorithms of control systems, models, & networks [9.2%]
			(467) - Mathematics [6.0%]
		(1364) - Physics & Mechanics [17.5%]	(737) - Mechanics & Magnetics [9.5%]
			(627) - Physics [8.1%]
	(3525) - Chemistry & Materials Science [45.3%]	(2026) - Materials Science [26%]	(1664) - Physics of Materials & Nanomaterials [21.4%]
			(362) - Physical properties of thin films & substrates [4.7%]
		(1499) - Chemistry [19.3%]	(1173) - Chemistry of Organic & Inorganic Materials [15.1%]
			(326) - Chemistry of Crystals [4.2%]

The first level has two categories: Biomedical Sciences (1711) and Physical & Engineering Sciences (6069). Percentage-wise, this is a split of 22/78%. In Table 12 (the manual assignment of GST clusters to categories defined by the word clustering approach), combining Biological & Medical Sciences, and Environmental Sciences categories is equivalent to the Bio-Medical Sciences category in Figure 4. Also, combining the Chemistry, Computer Sciences & Systems, Materials Sciences, and Physics & Mathematics categories in Table 12 is equivalent to the Physical & Engineering Sciences category in Figure 4. In Table 12, the category split of 11/89% compares roughly with the 22/78% split of Figure 4.

The second taxonomy level is generated by sub-dividing each first level category by two. Biomedical Sciences divides into Laboratory Medical Research (865) and Clinical Medicine (846), while Physical & Engineering Sciences divides into Physics, Mechanics, & Mathematics (2544) and Chemistry & Material Science (3525).

Again, comparing Figure 4 with Table 12, Laboratory Medical Research (from Figure 4) is roughly equivalent to Biological & Medical Sciences (from Table 12), and Clinical Medicine (from Figure 4) which splits into Geology & Environmental Sciences at the third taxonomy level is partially equivalent to Environmental Sciences (from Table 12). The term 'roughly' is used because sometimes allocation to Biology vs Medicine is not overly clear, or assignment to Biology vs Environment is not overly clear. The (Laboratory Medical Research)/(Clinical Medicine) ratio from Figure 4 (1.02) compares

poorly with the (Biological & Medical Sciences)/(Environmental Sciences) ratio from Table 12 (14.9). The definitional uncertainties are reflected in quantitative differences. Inspection of the GST clusters vs their partitional clustering counterparts shows that these quantitative differences represent manual assignment of clusters to categories vs computer assignment of cluster to categories, more than any intrinsic cluster differences.

Further, Physics, Mechanics & Mathematics (from Figure 4) is roughly equal to Physics & Mathematics combined with Computer Sciences & Systems (from Table 12), and Chemistry & Materials Science (from Figure 4) is roughly equal to the combination of Chemistry and Materials Science (from Table 12). The term 'roughly' is used here because sometimes the allocation to Chemistry vs Physics is not overly clear, especially for materials projects, where the physics of materials and the chemistry of materials are sometimes indistinguishable. The (Physics, Mechanics & Mathematics)/(Chemistry & Materials Science) ratio from Figure 4 (.72) compares moderately with the (Physics & Mathematics combined with Computer Sciences & Systems)/(Chemistry combined with Materials Science) ratio from Table 12 (.35).

The lower taxonomy levels are generated in the same manner as above. It can be seen in Figure 4 in the fourth taxonomy level that several categories stand out as receiving significantly more focus than the others. These categories are Physics of Materials & Nanomaterials (21.4%) and Chemistry of Organic & Inorganic Materials (15.1%) with the most focus, followed by Mechanics & Magnetics (9.5%), Algorithms of Control Systems, Models & Networks (9.2%), Physics (8.1%), and Mathematics (6.0%) as compared to the other ten categories ranging from 2.1-4.7%.

Several other observations can be made from an analysis of this data set. These abstracts are research oriented as would be expected from those obtained in the SCI database. Most of the major research areas appear to be represented, but engineering science (other than materials engineering) does not play a prominent role at the upper taxonomy levels. Using 40 clusters allows a reasonable picture to be drawn about broad areas of research. If detailed program thrusts were desired, however, many more clusters than 40 would be required. The specific number depends on the degree of focus desired.

4.4.2.2.3.2.2 Engineering Compendex (256 Clusters, 2000 - 2003)

The 9949 records from this data set were run through the CLUTO algorithm using 256 clusters. This resulted in generating 510 total clusters aggregated into the hierarchical tree with thirteen levels based on the 256 elemental clusters. In Figure 5 below, the columns represent the taxonomy levels. The top four of the thirteen levels are depicted in this taxonomy. The highest level (Level-1 with two categories) is the second column, and the lowest level shown (Level-4 with sixteen categories) is the last column. The numbers in parentheses represent the number of records assigned to the category. The numbers in brackets represent the percentage of the number of records in that category to the total number of records.

Figure 5. Partitional Document Clustering (CLUTO) Taxonomy Levels 1-4 (Engineering Compendex, 256 Clusters, year 2000-2003)

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
(9949) - Physical and Computer Sciences [100%]	(4721) - Computer Sciences [47%]	(3902) - Cybernetics & Systems Engineering [39%]	(3178) - Power & Systems Engineering [31.9%]	(852) - Power/Energy Market Enterprises [8.6%]
				(2326) - Systems Theory [23.4%]
			(724) - Networks & algorithms (neural, comms, mobile, wireless, genetic) [7.3%]	(387) - networks -- neural, communications, mobile, wireless [3.9%]
				(337) - algorithms - genetic, (adaptable, learning, smart) [3.4%]
		(819) - Signal Processing (image, digital, wavelets) [8%]	(511) - Image Processing (detection & embedding) [recognition, matching, retrieval, segmentation] [5.1%]	(339) - image processing (reconstruction, matching, retrieval, & segmentation) [for similarities] [3.4%]
				(172) - image processing and watermarks (detecting & embedding) [for differences] [1.7%]
			(308) - Signal Processing (wavelets & digital signal processing) [3.1%]	(182) - wavelets in imaging & non-imaging signals [1.8%]
				(126) - digital signal processing to extract signals [1.3%]
	(5228) - Physical Sciences [sub-systems] [53%]	(3477) - Materials Science & Mathematics [35%]	(474) - Mathematics (Solutions & Equations) [4.8%]	(209) - Solutions (Periodic & Non-periodic) [2.1%]
				(265) - Equations [2.7%]
			(3003) - Physics of Structural Mechanics & Materials [30.2%]	(921) - Applied Measurements (with Optics & Lasers) [9.3%]
				(2082) - Structural Mechanics & Materials [20.1%]
		(1751) - Chemistry & Nanotechnology [18%]	(747) - Nano-technology (Nano-structures & Materials) [7.5%]	(285) - Nanostructures [2.9%]
				(462) - Crystals, Glass, Lasers, Plasmas, and Magnetic & Piezoelectric Compounds [4.9%]
			(1004) - Chemistry (Organic & Inorganic) [10.1%]	(285) - Inorganic Chemistry (Solid & Liquid Material Dopping) [2.9%]
				(719) - Organic Chemistry [7.2%]

The first level has two categories: Computer Sciences (4721) and Physical Sciences (5228). Percentage-wise, this is a split of 47/53%. The second taxonomy level is generated by sub-dividing each first level category by two. Computer Sciences divides into Cybernetics & Systems Engineering (3902) and Signal Processing (819), while Physical Sciences divides into Materials Science (3477) and Chemistry & Nanotechnology (1751). The lower taxonomy levels are generated in the same manner as above. It can be seen in Figure 5 in the fourth taxonomy level that several categories stand out as receiving significantly more focus than the others. These categories are Systems Theory (23.4%) and Structural Mechanics & Materials (20.1%) with the most focus, followed by Applied Measurements (9.3%), Power/Energy Market Enterprises (8.6%), and Organic Chemistry (7.2%) as compared to the other eleven categories ranging from 1.3 – 4.9%.

Several other observations can be made from an analysis of this data set. These abstracts are more applied research, advanced technology development and engineering oriented as compared to the SCI data, as would be expected from those obtained in the Engineering Compendex database. They also cover a broad range of fields ranging from industrial to high tech electronics that are indicative of a large society growing to sustain itself and become technologically competitive on a global scale.

Examples of some key areas receiving emphasis (not necessarily evident in Figure 5) are as follows; Energy/Power Generation, Mining, Materials & Structural Mechanics, Signal

Processing, Systems Engineering, Transportation & Traffic flow, Robotics, Sensors & Diagnostics, Advanced Communications, Nanotechnology, Assessment Methods, Mathematics, Environmental & Ecological, Modeling & Simulation, and Control Theory. All of these areas have applications that can be of military significance.

Efforts in energy and power generation include hydroelectric, nuclear, and fossil fuels (such as coal), with the emphasis on the later. Improvements are being sought for more efficient yields of energy from these resources. Power generation spans from the Power Plants to vehicles to small electronic devices. The efforts in fossil fuels are closely tied with mining and structural developments.

The efforts in mining include identify areas of opportunity for different resources, improving mine structures to prevent collapse. These efforts can be closely associated with other work in remote sensing to help locate resources and conduct environmental impact studies. The same efforts to improve structural developments in mines might also be applied to underground facilities. Materials and structural mechanics fields range from the macro level (geologic formations and superstructures) to the micro and nano level (e.g. particles, ligands, compounds, films, and nanowires). There are specific references of structural analyses being done for a *New-Concept Submarine* and *low noise torpedo*, as well as for solid rocket motors.

Systems, control theory, modeling, and simulation are closely associated with all other areas. They range from the macroscopic, such as improving trafficability movements of large vehicles, resources, people, and robotics to the microscopic, such as gene manipulation. They are being done for things small and large in numbers, such as tracking and/or controlling Unmanned Aerial Vehicles (UAVs) in a dense air traffic environment. Vibrational analysis is being performed with specific applications to missile launches on naval ships. Signal processing techniques are also closely related to these fields as well and incorporate wavelets, digital signal processing and neural networks. Applications of these studies include remote detection and biometrics.

Assessments, testing, and diagnostic methods include studies of text mining, Transmission Electron Microscopy (TEM), X-ray Diffraction (XRD), Magnetic Resonance Imaging (MRI's), and other high precision diagnostic instrumentation that can be used in nuclear weapons development. Long range plans are made that include research, such as the specific reference to a new 5-year coal mining plan.

Communications related research studies things such as fiber optics, optical comms in seawater, digital, wireless networks, mobile networks, millimeter waveguides, blind signature schemes in cryptography, and security protocols.

This EC data set can not be directly compared to the GST data set as was done in the previous section with the CLUTO partitional clustering of the SCI 40-cluster because it is a different set of data. However, some observations can still be made comparing Figures 4 & 5. The EC taxonomy in Figure 5 roughly aligns with the Physical & Engineering Sciences portion of the SCI taxonomy in Figure 4, but does not include the Bio-Medical

Sciences half. The Geology & Enviromental Sciences theme in the SCI's third level (Figure 4) roughly matches up with some lower levels in Appendix 6E that are not reflected in Figure 5.

4.4.2.2.3.2.3 Science Citation Index (256 Clusters, 2005)

Figure 6 – 2005 Chinese Research Taxonomy

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
physical and engineering sciences (19807)	chemical reactions, molecular and atomic structure (5841)	molecular and crystal structure (1813)	atomic bonds and the crystal structure of molecules (1297)
			crystal orientation of molecules/atoms/ visualization (516)
		chemical reactions and behaviors, chemical analysis, liquid chromatography (4028)	catalytic reactions (2270)
			adsorption of chemicals, analysis of chemicals by liquid chromatography (1758)
	Physics, thin films,alloys, and nanomaterials, the mechanical properties of materials (13966)	structural and mechanical properties of materials, materials analysis (8056)	nanomaterial structure, structural visualization (2830)
			alloys, alloy composition, composition/structure (5226)
		Physics, thin films and optics (5910)	thin films, thin film deposition (1274)
			structure and properties of thin films (thickness, density function, etc) and optics and physics (4636)

life sciences, environmental sciences, and mathmatics (14539)	mathematics, algorithm and program development, modeling (mathematical & algorithmic), system modeling (7162)	mathematics: differential equations, algebraic equations (2333)	differential equations, equations of systems (1287)
			algebraic equations and functions (1046)
		mathematical modeling and genetic algorithms (4829)	system and network modeling, large scale modeling, neural networks (3552)
			genetic algorithems, imaging (1277)
	cellular and genetic biology, health, and geophysics/geology (7377)	genetic and cellular expression (3739)	gene expression, sequencing (1018)
			cellular expression (2721)
		chinese geophysics; health research (3638)	chinese medical patients (1837)
			Soils, plants and rare earth elements (1801)

The first major division (first level) in the 2005 taxonomy is physical and engineering sciences (19807) and life sciences and mathematics (14539). While mathematics is applicable to physical, engineering, and life sciences, it typically is categorized with the physical sciences. It appears that the life-sciences based terminology of some branches of mathematics (genetic programming, genetic algorithms, neural networks, etc) resulted in mathematics being assigned by the clustering algorithm to the life sciences category. For purposes of this discussion, mathematics will be treated as part of the physical and engineering sciences category.

The physical and engineering sciences category (with mathematics included) has 3.66 times as many records as life sciences, which shows China's strong emphasis in physical and engineering sciences relative to life sciences The physical and engineering sciences branch further splits into chemistry, physics/ materials, and mathematics ("chemical

reactions, chemistry" (5841), "physics, thin films, alloys, and nanomaterials, the mechanical properties of materials" (13966), "mathematics, algorithm and program development, modeling (mathematical & algorithmic), system modeling" (7162)). The "physics, thin films, alloys, and nanomaterials, the mechanical properties of materials" category has almost three times as many records as the "chemical reactions, chemistry" category, and twice the records of the mathematics category. The other main branch of the tree, life sciences and mathmatics, consists only of life sciences ("cellular and genetic biology, health, and geophysics/geology" (7377)) for the present discussion.

The third level of the hierarchy offers further differentiation. The chemistry category divides into a more fundamental structural sub-category ("molecular and crystal structure" (1813)) and a more applied dynamic sub-category ("chemical reactions and behaviors, chemical analysis, liquid chromatography" (4028)), with twice the output in the applied dynamic sub-category, The physics/ materials category divides into a physics sub-category ("physics, thin films and optics" (5910) and a materials sub-category ("structural and mechanical properties of materials, materials analysis" (8056)), The physics sub-category focuses on surface phenomena (e.g., films), and much of the thin film work could be considered as overlapping with the materials category. The materials sub-category focuses on bulk material phenomena, with the exception of the nanomaterials component. Thus, the physics/ materials category has a heavy weighting toward the materials component, with attention paid to both bulk and surface phenomena. The mathematics category divides into a more fundamental mathematical analysis category ("mathematics: differential equations, algebraic equations" (2333)) and a more applied mathematical modeling sub-category ("mathmatical modeling and genetic algorithems" (4829)), with twice the output in the more applied modeling category. The life sciences category divides into a fundamental biology category ("genetic and cellular expression" (3739)) and a combination of applied clinical medicine and environmental geobiophysics ("Chinese geophysics; health research" (3638)).

The fourth hierarchical level provides further differentiation, and specific topics begin to emerge. To define these sixteen sub-categories more definitively, the following approach was used. Based on the hierarchical tree structure, the elemental clusters (from the 256 total) that fall under each fourth level sub-category are identified, and their themes listed under each fourth-level sub-category in bulletized summary form. The order of presentation is that shown on Figure 1, starting from the top sub-category of level 4. The one digit prefixes in the following refer to level 1 categories; the two digit prefixes refer to level 2 categories; the three digit prefixes refer to level three categories; and the four digit prefixes refer to level four categories.

<u>Level 4 Descriptions at the Elemental Cluster Level</u>

1. Physical and Engineering Sciences
1.1. chemical reactions, chemistry
1.1.1 the structure of molecules, crystal structure (1813)
1.1.1.1. atomic bonds and the crystal structure of molecules (1297)

· the bonds between atoms and molecules, specifically hydrogen bonding, and atom interaction.
· compounds containing intramolecular hydrogen bonds, with emphasis on their structure.
· compounds and molecules containing rings, such as benzene rings, with emphasis on their synthesis and characterization.
· the atomic structure of molecules and compounds.
· atomic structure concentrating on O2 and N2 atoms, with emphasis on ligands and synthesis of complexes.
· chemistry with emphasis on chemical mechanics.
· various metal complexes and chemical properties of materials, with emphasis on ligands.

1.1.1.2 the crystal orientation of molecules/atoms/ visualization (516)

· single crystal x-ray diffraction method for analyzing compounds and their structure.
· the characterization of crystal structures, especially space groups.
· crystallographic structures and space groups, especially determination of unit cell dimensions: (designated as a, b, and c) in angstroms.

1.1.2 chemical reactions, liquid chromatography (4028)
1.1.2.1. catalytic reactions (2270)

· isolation of compounds and elucidation of their structures.
· glucopyranosyl, especially isolation of chemical compounds containing glucopyranosyl.
· alpha and beta cyclodextrin.
· the characteristics of various molecules, such as molecular weight, degradation of the molecules, etc.
· the structure and characteristics of various molecules, mainly using NMR mass spectrometry.
· various chemical compounds and their synthesis.
· kinetics of reactions.
· various chemical reactions, and the product of those reactions and the conditions needed for the reaction, more specifically reaction temperature.
· synthesis of chemicals and chemical reactions.
· various chemical reactions and specifically on their yields.
· chemical reactions with an emphasis on catalyzing agents.
· chiral compounds, chiral ligands and enantioselectivity.
· aldehydes, especially aromatic aldehydes, with emphasis on reactions involving them.
· ionic liquids, especially BMIM: (butyl methylimidazolium), with emphasis on its use as a reaction medium and promoter to increase reaction yields.
· catalysts and their use.
· chemical reactions, specifically those involving catalysts.

· molecular sieves, especially those comprised of MCMs: (mesoporous crystalline materials), with emphasis on their synthesis and characterization.
· zeolites and their formation and chemical makeup, as well as various catalysts.

1.1.2.2 adsorption of chemicals, and analysis of chemicals by liquid chromatography (1758)

· adsorption and removal of matter from various media using various adsorption media.
· surfactants and micelles and their aggregates.
· water, and various chemical reactions/solutions that involve/contain water. Also talks about membranes, and the properties of solutions containing water.
· acids and their uses, as well as the degradation of various compounds, either by acids or using other means.
· the preservation of fruits after harvest and its relation to the concentration of CO2 in the controlled environment.
· devices containing or utilizing gold, with emphasis on electrodes, especially self-assembled monolayers: (SAMs), and biosensors.
· electrodes in electrochemical systems, especially carbon-based electrodes.
· molecular detection, as well as electrode fabrication and use.
· chemiluminescence, emphasizing issues of detection limit for detecting trace material amounts, especially at the microgram level of concentration.
· chemical separation methods, especially those based on capillary electrophoresis: (CE).
· different means of either charge or mass separation, high pressure liquid chromatography, or liquid-liquid extraction
· mass spectrometry and liquid chromatography.
· compounds and enzymes, with emphasis on their synthesis, separation, and purification, and especially the use of chromatography.
· the extraction and recovery of one physical component from another physical component.

1.2. thin films and mechanical properties of materials
1.2.1 the structural and mechanical properties of materials (8056)
1.2.1.1. nanomaterial structure, structural visualization (2830)

· polymers, their formulation, their formation, and their uses.
· various polymers, copolymers, monomers, and grafting.
· polymers, especially block copolymers, with emphasis on their synthesis.
· the crystal structures of various compounds and their physical properties such as melting properties with the analysis done by differential scanning calorimetry.
· blends, especially of polymers, with emphasis on high density polyethylene as well as mechanical and melt properties.
· curing and resins, with emphasis on curing of resins.
· synthesis of nanocomposites, particularly polymer/clay nanocomposites containing montmorillonite: (MMT).

· carbon nanontubes, especially their synthesis and structure
· nanotubes, especially synthesis of carbon nanotubes.
· single-wall and multi-wall carbon nanotubes; includes studies that focus on their synthesis, characterization, and use in reactions involving other materials.
· nanowires, especially their synthesis and characterization.
· ZnO, especially ZnO nanorods, with emphasis on their synthesis and structure
· nanostructures, especially nanorods and nanobelts, and their formation and characteristics
· electron microscopy, especially transmission electron microscopy: (tem).
· nanoparticles, especially those containing gold.
· colloidal silver spheres and their self assembly.
· mesoporous silicas.
· the separation of materials, pore sizes in filter media and the structure of the filter media itself.
· various suspensions, and the nanoparticles in them. Also talks about powders and the particles' surface area.
· powders and their fabrication and synthesis and mechanical properties.
· particulate matter of varying types, and its size and size distribution.
· shells and encapsulating various compounds within them.
· TiO2, especially its photocatalytic behavior.

1.2.1.2 alloys, alloy composition, composition/structure (5226)

· pressure and high pressure. Sometimes discusses chemical reactions or geologic phenomina.
· % temperature and associated phenomena.
· the different phases of materials as well as the effect that phase change has on the material.
· the magnetic properties of materials along with feromagnets, as well as the doping of various materials to make them magnetic.
· magnetic properties of various materials, the effects of magnetization on various materials.
· magnets and magnetic fields.
· turbulent flow, especially vortex dynamics and modeling.
· flow dynamics and fluid flow modeling.
· heat transfer.
· heat transfer mechanics and applications, as well as heat transfer experiments.
· air cooling and heating systems, especially their energy consumption and efficiency.
· cracking, crack tip growth rates, and stress intensity factors of materials.
· the mechanical properties of materials, and stresses on them, along with what happens to stressed materials. Also talks about residual stresses, and stress testing and stresses in rocks.
· mechanical properties of materials with emphasis on damage to the material, plastic deformation and fatigue life.
· the deformation behavior of materials as determined through experimental investigations.

- the loading of structural members along with their mechanical properties and the failure modes of various beams, laminates and other materials.
- finite element models.
- martensitic transformation temperatures, particularly of shape memory alloys
- Focus on glasses, especially metallic glasses, with emphasis on synthesis and characterization of properties such as glass transition temperature.
- characterization of alloys, especially amorphous alloys, with emphasis on high temperature and magnetic properties.
- alloy synthesis and electrochemical characterization, with emphasis on characterization of hydrogen storage and discharge capacity.
- the creation/formation/evaluation of alloys and their microstructure.
- coatings, especially composite coatings.
- wear resistance of materials, especially experimental evaluation of wear resistance properties.
- the composition, mechanical properties, and synthesis of various materials.
- the charge and discharge capacity of various materials, and mainly their use in electrochemical/electrical charge transfers. Basically it batteries/battery cells.
- solder and solder joints, particularly lead free solder, with emphasis on solidification, structure, and properties.
- the structure and properties of materials, with emphasis on characterization of welds and fatigue and fracture behavior.
- corrosion and pitting resistance of metals and alloys, including steels and stainless steels.
- various steels, especially ferritic and austenitic, with an emphasis on failure modes, testing, and composition
- the grain structure of various alloys and the microstructure of such alloys.
- various sintering techniques such as spark plasma sintering, and the mechanical properties of sintered materials as well as proper sintering techniques.
- ceramics, including fabrication, doping, and mechanical properties.
- characterization of the dielectric properties of ceramics.

1.2.2 thin films and optics (5910)

1.2.2.1. thin films, thin film deposition (1274)

- films, especially thin films, with emphasis on their synthesis and evaluation.
- thin films and their deposition.
- various films, discussing formation, doping, deposition etc.
- diamond films, including nano-structured diamond films, with emphasis on their deposition by various methods.
- films and doping agents that are embedded or placed on films, such as sensors.
- films, specifically composite films and polymer films.

1.2.2.2 structure and properties of thin films (thickness, density function, etc) and optics and physics (4636)

- thin films and their substrates, and film deposition.
- etched layers, usually of silicon, and includes quantum dots as well.
- devices, especially organic light emitting devices, including light emitting diodes: (LEDs), with emphasis on their fabrication.
- black holes and black hole event horizons, with emphasis on their associated entropy.
- many different aspects of astronomy, including pulsars, gamma ray emission and luminosity.
- stars, and their relation to composition and evolution of galaxies.
- the emission properties of materials, especially photoluminescence.
- Europium ion: (Eu^{3+} and Eu^{2+}) doped phosphors, especially their synthesis and characterization, with emphasis on luminescent properties.
- glasses containing Er^{3+}, especially for upconversion laser applications.
- the fluorescence of various materials/atoms/compounds and fluorescence quenching.
- chitosan, and the separation of various molecules specifically by means of absorption.
- photons: (emission/absorption/interaction) and multi-level atomic systems emphasizing the role of fields on the photon and atomic system behaviors.
- pulses from optical lasers.
- lasers and pumped lasers.
- fiber optics and the component fibers.
- fibers, especially fibers for composites and concrete reinforcement, with emphasis on their syntheis and characterization.
- gratings, especially fiber Bragg gratings: (FBGs), with emphasis on their development as sensors and optical elements.
- power, namely electrical power, as well as various switches and power converters.
- the resonant frequencies of various excited particles.
- antennas, particularly patch antennas, with emphasis on their design and characterization.
- waveguides along with Finite Difference Time Domain analysis of the waveguides.
- electromagnetic, gravitational, and other waves, and their propagation.
- beams, especially Gaussian beams.
- optics, both biological: (human eye) and mechanical: (optical crystals etc, with some emphasis on solitons).
- the spectra of various molecules and how the spectra was obtained, especially ion absorption and laser optics
- various crystals and their light carrying/ other optical properties, as well as defects in them.
- doped materials, especially crystals and their various parameters that fall in different bands. Also emphasizes optical band gaps.
- the structure of various molecules and atoms or clusters of atoms. Also discusses the orbit of electrons, and the density and structure based on density functional theory.
- the bonds between atoms and molecules, with emphasis on their electron transfer.
- reactions, especially their energy and transition states.
- the energy states of various charged particles.
- the states of various systems, and their synchronization and coupling.

· various topics in astrophysics, and physics in general.
· quantum particules, and quantum dots, and the spin of electrons.
· quantum entanglement and entanglement states.
· decays of subatomic particles, especially those involving branching fractions.
· quarks and quark models.
· energy levels in the GeV range; especially energies related to the motion and interaction of sub-atomic particles.
· cross sections, especially related to quantum reactions/interactions.
· various experiments that probe the nucleus, emphasizing detection of protons and neutrons.

2. life sciences and mathematics
2.1. mathematics, algorithm and program development, modeling (mathematical & algorithmic)
2.1.1 mathematics and differential equations (2333)
2.1.1.1. differential equations, equations of systems (1287)

· mathematics: boundary conditions, equations, etc.
· numerical equations, especially solution of numerical equations for fluid flows, such as the navier stokes equation.
· differential equations to describe various systems
· mathematics, especially solution techniques for mathematical equations.
· exact solutions, including solitary wave solutions, to various equations and functions.
· solitons: (waves), especially equations and solutions related to them.
· evaluations of systems, especially those involving limit cycles, homoclinic loops or orbits, and oscillation or oscillators.
· bifurcation, especially Hopf bifurcation.
· positive periodic solutions to system equations.
· the existence of positive solutions to equations, especially those involving a fixed point theorem.
· mathematical equations and mathematical models and systems.

2.1.1.2 algebraic equations and functions (1046)

· mathematical investigations, with emphasis on solutions to equations and functions.
· graphs and curves, especially theories and proofs involving them
· algebras, especially Lie algebra and loop algebra.
· system symmetries, especially Lie symmetries and non-Noether conserved quantities.
· mathematical theorems.
· mathematics, with emphases on spaces and manifolds.
· mathematics, with a strong emphasis on matrices.
· the various functions of finite element models, and the mathematics associated with them.

- computer optimization of data sets, along with optimization functions.

2.1.2 mathematical modeling and algorithms (4829)
2.1.2.1. genetic algorithms, imaging (1277)

- algorithm development, especially modeling, convergence, and optimization.
- various computer algorithms.
- algorithems, especially search algorithms, development for specific problems of interest.
- algorithms, with an emphasis on clustering algorithms.
- wavelets.
- speech, voice, and written or typed character characterization and classification, with emphasis on feature/ word extraction.
- face recognition algorithms.
- imaging, both the instruments used and the mechanics behind taking images.

2.1.2.2 system and network modeling, large scale modeling, neural networks (3552)

- video, especially sports video, with emphasis on watermarking.
- caching schemes and caches, especially proxy caches, as they relate to media streaming on networks and servers
- coding over channels, with emphasis on errors and fading.
- estimation, and the error associated with estimation.
- filters, especially those designed to reduce noise.
- chaotic systems, especially their control and synchronization.
- various control systems and the controllers themselves.
- mathematically fuzzy concepts, including fuzzy control, fuzzy models, fuzzy logic, etc.
- control of linear systems, especially related to time delay and feedback control.
- the stability of delayed neural networks, particularly cellular neural networks, with emphasis on global exponential stability
- neural networks, especially artificial neural networks: (ANNs).
- networks, specifically computer networks, and the various nodes in a network.
- traffic, mainly on internet and electronic traffic.
- signature and signature schemes, including proxy signature schemes, for data encryption
- security, especially system and protocol security.
- resource management, especially as it relates to computer networks, with emphasis on mobile agents and digital libraries
- Grid Computing, a system for computer resource sharing.
- web services, especially focused on semantic Web aspects.
- systems for storing and sharing data, especially peer to peer (P2P) systems
- peer to peer: (P2P) networks and file-sharing systems, with emphasis on their topology and topological mismatches.

· economics, specifically different markets, firms, and the price of goods in different economies.
· business structure and business modeling and supply chains, including the role of linguistics in the decision support systems.
· various construction projects, mainly in china.
· the design of new components, systems, and structures.
· systems, with minor emphasis on operating systems and software.
· machine scheduling and optimization, with emphasis on algorithms that deal with these subjects.
· support vector machines.
· environmental forcasting and modeling.
· data aquisition and system modeling.
· models, especially their parametric analyses.
· simulations, especially of fluid dynamical systems.

2.2. gene expresion and cellular biology

2.2.1 Chinese geophyics and Chinese citizens and their health problems (3638)

2.2.1.1. gene expression, sequencing (1018)

· isolates and strains of micro-organisms or genes, especially rRNA.
· DNA, particularly the immobilization of DNA, and enzymes.
· dna, specifically on detection, characterization, mutation, sequencing.
· dna and genomic sequencing.
· genes, especially cDNA.
· transgenic experiments, especially those involving transgenic plants.
· genes, and gene expression and genetic sequencing.

2.2.1.2 cellular expression (2721)

· various forms of cancer and possible treatments, and cellular expression.
· tumors, including tumor growth, metastases, treatment, and inhibition, with emphasis on experiments involving cells in mice or cell lines.
· various kinds of cells and their attributes, along with cellular expression.
· various kinds of cells, expression of those cells, and gene expression.
· multiple types of cells and what affects them, emphasizing apoptosis.
· kinase and receptor activation,and the signaling of the cells between the receptors.
· various chemicals or molecules/compounds that have an effect on the body (activation or inhibition) or the body’s reaction to various stimuli.
· the calcium ion, Ca+2, particulary as it relates to cells and cellular functions.
· neurons.
· experiments performed on rats, especially impacts on their brain.
· cellular expresson and tumor necrosis factor alpha and transforming growth factor.
· the use of mice in medical experiments.
· antibodies, vaccines, and immunity.
· proteins and their characterization and use.

· proteins, and protein separation, and protein analysis.
· proteins, viruses, antibodies and vaccines related to SARS: (Severe Acute Respiratory Syndrome)
· SARS: (Severe Acute Respiratory Syndrome), particularly studies involving SARS patients, cases and outbreaks.

2.2.2 genetic expression, and cells, mainly cancer cells (3739)
2.2.2.1. Chinese medical patients (1837)

· the circulatory system, emphasizing arteries and stents, and clinical problems associated with various patients.
· the renal system, and patients who have renal problems and some of their treatments.
· medical patients and their medical problems.
· medical/ biological experiments, and talks about the different groups in the experiment.
· the interaction of insects and their predators, and what influences the mortality of insects/fish.
· various clinical medical studies, usually involving women.
· sexually transmitted diseases such as HIV. Also smoking and its health problems, as well as other respiratory ailments.
· health problems among Chineese citizens, especially in Hong Kong.
· various social and health characteristics and behaviours of Chinese citizens and children.
· Chinese families, with emphasis on genetics and medicine.
· cancer risk and control.
· specific types of genes, especially polymorphs, and their functions.
· genetic diversity in populations.
· chromosomes and genes, especially genetic markers and traits.

2.2.2.2 Soils, plants and rare earth elements (1801)

· rock and mantle beneath North China, with emphasis on isotope dating.
· geological formations in China, with emphasis on determination of geologic age.
· seismic activity, including earthquakes.
· wind, both solar wind and lower atmospheric wind; includes wind modeling, and wind damage, as well as particulates in the wind such as dust and aerosols.
· creating climate models,especially over water or near coasts, and various ways to determine moisture concentrations and ways of measuring various quantities that affect climate, such as moisture etc.
· climate analysis (especially monsoons) and indoor air pollutant studies, mainly in china and the surrounding areas.
· sediments and sediment tracking and contamination in various water sources; lakes, rivers, estuaries, seas, etc.
· soil, especially the effects of soil properties on plants, in China

· plants, and plant roots. Includes waste remediation using plants, various health benefits of plants, and plant characterization and analysis.
· all matter of plants, both food plants and non-food plants, including seeds and their properties, such as germination rate
· various species of organisms and plants, and their characteristics. Also talks about DNA and comparing it between species.
· the identification of mainly zoological and entomological species in China.
· plant species.

The specific sub-thrusts (elemental clusters) in each of the above Level 4 categories, including the raw data for each elemental cluster, are listed and summarized in Appendix 4, which can also be viewed as a flat taxonomy from a Level 4 perspective.

Comparison of China's and USA's Investment Strategies

In the section on comparing China's research citations with those of India and Australia, the three criteria of 'right job', 'job right', and productivity/ progress were described. In any research evaluation, the first criterion to consider is 'right job'. If the research unit being evaluated is not aiming at the right target, the highest quality approach will not provide results useful to the organization's mission.

A major component of 'right job' is the research investment strategy. This includes the allocation of resources among the components of the research portfolio, and the rationale for that allocation. The taxonomy shown in the previous section reflects the present research investment strategy of China (based on published output). Of particular interest is how this investment strategy compares with that of other countries, and which particular areas China has chosen to emphasize.

One approach to performing such a comparison would be to compare taxonomies of different countries at different hierarchical levels. This requires that categories defined by the clustering algorithms would have similar content and theme, for those categories to be compared directly.

Another approach is based on the philosophy that very specific sub-technology areas should be compared, to identify precisely where different countries emphasize their investment. These critical sub-technologies emphasized by each country become the ***'dots' to be connected*** for understanding the overall country research strategy.

How specific should the technology areas be? Let us follow the chain of dis-aggregation, starting from the top. At the highest level would be the research articles for all of China. One could compare the number of research articles in a given year with that of, say, the USA, and draw very general conclusions about overall research output. This was essentially the approach of King, in comparing research output from 31 different countries (King, 2004). Very limited information can be obtained from this level of resolution.

At the next level would be research articles for each technology area for a country. The first author has proposed that making comparisons at this level for critical technologies provides a much more strategically important view of each country's capabilities (Kostoff, 2004d). Recent text mining studies on nanotechnology (Kostoff et al, 2006a) and energetic materials [unpublished] show that China is advancing rapidly in its research article production in these two critical technologies, and is second only to the USA in research article production. However, even these results aggregated at the critical technology level may be too aggregated for critical investment strategy emphasis analyses. If China is second to the USA, for example, in nanotechnology in general, might there be sub-areas of nanotechnology (e.g., nanocomposites, nanorods, etc) where China is actually leading the USA? And what would be the strategic implications of China heavily emphasizing research investment in such areas?

Thus, at the next level would be sub-critical technology areas, such as nanocomposites or nanorods in the nanotechnology example above. Further levels of dis-aggregation are possible, such as 'metal nanocomposites' or 'heavy metal nanocomposites'. The terminal level of resolution used for the comparison depends on the objectives of the study, and the numbers of articles available at the different levels.

This latter approach was used to compare the relative investment strategies of China and the USA for the present study, with a resolution at about the critical sub-technology level. The approach used was as follows. Ten thousand articles each of USA and China were downloaded from the SCI for 2005. At the time the download occurred, the total number of USA articles was 233,936 and the total number of China articles was 58,044. Thus, the USA had approximately four times the total number of research articles for 2005 as China.

A phrase frequency analysis was performed on each download, and the phrases were then combined. The ratio of frequencies for each phrase was tabulated. Phrases were ordered by ratio of occurrence in each country's download. Two bands were considered: phrases that had a large China/ USA frequency ratio and phrases that had a large USA/ China frequency ratio (the opposite ends of the spectrum). The phrases in these bands were inserted into the SCI, and the absolute values of numbers of records that contained these phrases (for the first 10.5 months of 2005) were obtained. The results are shown on Tables 15 and 16.

Table 15 (Chinese Strengths - SCI)

QUERY PHRASE	# 2005 SCI ABSTRACTS		ABSOLUTE RATIO	NORMALIZED RATIO
	CHINA	USA	(CHINA/USA)	(CHINA/USA)
Neural Network	489	394	1.24	4.96
Lyapunov	222	170	1.31	5.22
XRD	2141	347	6.17	24.68
Nanorods	359	117	3.07	12.27

Nanocomposites	330	328	1.01	4.02
Nanocrystals	451	392	1.15	4.60
Copolymer	496	500	0.99	3.97
Welding	102	123	0.83	3.32
Corrosion Resistance	152	52	2.92	11.69
Compressive Strength	76	67	1.13	4.54
Photodegradation	67	59	1.14	4.54
Zeolite	214	230	0.93	3.72
Ceramics	750	414	1.81	7.25
Alloy	1558	962	1.62	6.48
Heat Treatment	297	224	1.33	5.30

Table 16 (USA Strengths - SCI)

QUERY PHRASE	# 2005 SCI ABSTRACTS		ABSOLUTE RATIO	NORMALIZED RATIO
	CHINA	USA	(USA/CHINA)	(USA/CHINA)
Arthritis	51	1120	21.96	5.49
Pathology	63	1555	24.68	6.17
Health	371	11273	30.39	7.60
Cancer Risk	15	602	40.13	10.03
Psychiatric	17	1306	76.82	19.21
Cognitive	75	3123	41.64	10.41
Medication	27	1422	52.67	13.17
Galaxy	39	860	22.05	5.51
Antibiotics	80	877	10.96	2.74
Heart Failure	49	1292	26.37	6.59
Mental	63	2655	42.14	10.54
Telescope	55	846	15.38	3.85
Diabetes	123	2832	23.02	5.76
Pain	130	3216	24.74	6.18
Symptoms	171	4921	28.78	7.19

The difference in thematic emphasis between the USA and China is dramatic! ***China emphasizes the hard sciences that underpin defense and commercial needs. The USA emphasizes research areas focused on medical, psychological, and social problems.*** There are even research areas where ***<u>China leads the USA in absolute numbers of</u>***

research articles published. In those areas, China's relative investment strategy is greater than four times that of the USA.

A number of these detailed areas in which China places high emphasis are related to nanotechnology. A recent nanotechnology text mining study (Kostoff et al, 2006a) showed that China was second to the USA in nanotechnology research article productivity. This means that at the next level or two lower in aggregation, there could be nanotechnology sub-areas in which China was actually leading in absolute numbers of research article production, and also areas in which they were well behind the USA in absolute numbers of research article production. The present analysis confirms that hypothesis, and suggests that the USA should pay particular attention to those areas in which China has chosen to apply substantial relative emphases.

The next two tables are similar to Tables 15 and 16, except that they contain common (to USA and China) high frequency phrases that were derived from the Engineering Compendex (EC), instead of the SCI. They also contain comparisions of occurence frequency for a given query term between the EC and the SCI. Both China and the USA had similar numbers of records in the EC (for those records that contained a country address), so no normalization was needed.

Table 17 contains a set of phrases taken from the Engineering Compendex (EC) in which China had a large lead relative to the USA in terms of the ratio of record occurrences. Those terms and their ratios of occurence were then compared to the ratio of China and USA records in the SCI.

In general, the EC is a much more applied database than the SCI, and some of the words/ phrases chosen in Tables 17 and 18 reflect that. Some of the phrases, such as XRD, were high frequency shared phrases not only in the China EC phrase list, but also in the China SCI phrase list. The specific number of records retrieved by a query term may be different in Tables 15 and 17 (e.g., XRD), and is due to the fact that the data for these tables were downloaded on different days. There are new records uploaded to the SCI and EC every day, so from day to day there can be an increase in terms of number of records that are returned from a specific query.

Table 17 (Chinese Strengths – EC)

QUERY PHRASE	# 2005 EC ABSTRACTS		ABSOLUTE RATIO EC	2005 SCI ABSTRACTS		ABSOLUTE RATIO SCI
	CHINA	USA	CHINA/USA	CHINA	USA	CHINA/USA
Bearing Capacity	145	12	12.08	15	13	1.15
XRD	2213	237	9.34	2582	418	6.18
Microhardness	174	22	7.91	129	53	2.43
Photoelectric	86	13	6.62	57	37	1.54
Diesel Engine	152	23	6.61	33	46	0.72
Wavelet Transform	338	54	6.26	119	90	1.32
Fiber Bragg Grating	115	19	6.05	56	19	2.95

Wear Resistance	213	37	5.76	161	63	2.56
Annealing Temperature	214	39	5.49	182	81	2.25
Impact Strength	92	19	4.84	57	27	2.11
Magnetron	285	60	4.75	292	133	2.20
Countermeasures	57	13	4.38	9	59	0.15
Intrusion Detection	100	23	4.35	33	36	0.92
Missile	100	24	4.17	6	45	0.13

Table 18 (USA Strengths – EC)

QUERY PHRASE	# 2005 EC ABSTRACTS		ABSOLUTE RATIO EC	2005 SCI ABSTRACTS		ABSOLUTE RATIO SCI
	CHINA	USA	USA/CHINA	CHINA	USA	USA/CHINA
Biochemistry	47	1498	31.87	42	445	10.60
Epithelial	9	182	20.22	238	5155	21.66
C-Terminal	17	308	18.12	110	1513	13.75
Microbiology	13	196	15.08	13	207	15.92
Aeronautics	13	176	13.54	1	46	46.00
Transmembrane	14	176	12.57	89	1480	16.63
Viral	10	121	12.10	241	3942	16.36
Prostate	11	136	12.36	103	3828	37.17
Cytoplasmic	13	162	12.46	107	1933	18.07
Patient	28	351	12.54	482	15699	32.57
Peptides	36	408	11.33	313	3132	10.01
Transfection	9	101	11.22	169	980	5.80
Ecosystems	15	164	10.93	82	1158	14.12
Mortality	13	127	9.77	275	8138	29.59

Tables 17 and 18 confirm that in the EC, as in the SCI, China's focus is on the hard sciences and especially engineering sciences, whereas the USA's relative focus is on health and biology-based research. In the overtly military-related terms (countermeasures, intrusion detection, missile), China has a commanding presence. One interesting exception is the presence of 'aeronautics' in the list of USA dominant terms. Similar anomalies have been noted in past studies. In technologies that require a large infrastructure, and therefore large investment, China has tended to be under-represented, and that probably accounts for the 'aerospace' under-emphasis.

5 Summary and Conclusions

Structure of Chinese Science in Technical Categories

The first major division (first level) in the 2005 taxonomy is physical and engineering sciences (19807 records) and life sciences and mathematics (14539 records). While mathematics is applicable to physical, engineering, and life sciences, it typically is categorized with the physical sciences. It appears that the life-sciences based terminology of some branches of mathematics (genertic programming, genetic algorithms, neural networks, etc) resulted in mathematics being assigned by the clustering algorithm to the life sciences category. For purposes of this discussion, mathematics will be treated as part of the physical and engineering sciences category.

The physical and engineering sciences category (with mathematics included) has 3.66 times as many records as life sciences, which shows China's strong emphasis in physical and engineering sciences relative to life sciences The physical and engineering sciences branch further splits into chemistry, physics/ materials, and mathematics ("chemical reactions, chemistry" (5841), "physics, thin films,alloys, and nanomaterials, the mechanical properties of materials" (13966), "mathematics, algorithm and program development, modeling (mathematical & algorithmic), system modeling" (7162)). The "physics, thin films, alloys, and nanomaterials, the mechanical properties of materials" category has almost three times as many records as the "chemical reactions, chemistry" category, and twice the records of the mathematics category. The other main branch of the tree, life sciences and mathmatics, consists only of life sciences ("cellular and genetic biology, health, and geophysics/geology" (7377)) for the present discussion.

The third level of the hierarchy offers further differentiation. The chemistry category divides into a more fundamental structural sub-category ("molecular and crystal structure" (1813)) and a more applied dynamic sub-category ("chemical reactions and behaviors, chemical analysis, liquid chromatography" (4028)), with twice the output in the applied dynamic sub-category, The physics/ materials category divides into a physics sub-category (physics, thin films and optics" (5910) and a materials sub-category ("structural and mechanical properties of materials, materials analysis" (8056)), The physics sub-category focuses on surface phenomena (e.g., films), and much of the thin film work could be considered as overlapping with the materials category. The materials sub-category focuses on bulk material phenomena, with the exception of the nanomaterials component. Thus, the physics/ materials category has a heavy weighting toward the materials component, with attention paid to both bulk and surface phenomena. The mathematics category divides into a more fundamental mathematical analysis category ("mathematics: differential equations, algebraic equations" (2333)) and a more applied mathematical modeling sub-category ("mathmatical modeling and genetic algorithems" (4829)), with twice the output in the more applied modeling category. The life sciences category divides into a fundamental biology category ("genetic and cellular expression" (3739)) and a combination of applied clinical medicine and environmental geobiophysics ("Chinese geophysics; health research" (3638)).

Structure of Chinese Technology in Technical Categories

These conclusions are based on EC data. The first level of the technology taxonomy has two categories: Computer Sciences (4721 records) and Physical Sciences (5228 records). Percentage-wise, this is a split of 47/53%. The second taxonomy level is generated by sub-dividing each first level category by two. Computer Sciences divides into Cybernetics & Systems Engineering (3902) and Signal Processing (819), while Physical Sciences divides into Materials Science (3477) and Chemistry & Nanotechnology (1751). The lower taxonomy levels are generated in the same manner as above. In the fourth taxonomy level, several categories stand out as receiving significantly more focus than the others. These categories are Systems Theory (23.4%) and Structural Mechanics & Materials (20.1%) with the most focus, followed by Applied Measurements (9.3%), Power/Energy Market Enterprises (8.6%), and Organic Chemistry (7.2%) as compared to the other eleven categories ranging from 1.3 – 4.9%.

Additionally, the Abstracts also cover a broad range of fields ranging from industrial to high tech electronics that are indicative of a large society growing to sustain itself and become technologically competitive on a global scale. Examples of some key areas receiving emphasis are as follows; Energy/Power Generation, Mining, Materials & Structural Mechanics, Signal Processing, Systems Engineering, Transportation & Traffic flow, Robotics, Sensors & Diagnostics, Advanced Communications, Nanotechnology, Assessment Methods, Mathematics, Environmental & Ecological, Modeling & Simulation, and Control Theory. All of these areas have applications that can be of military significance.

Efforts in energy and power generation include hydroelectric, nuclear, and fossil fuels (such as coal), with the emphasis on the later. Improvements are being sought for more efficient yields of energy from these resources. Power generation spans from the Power Plants to vehicles to small electronic devices. The efforts in fossil fuels are closely tied with mining and structural developments.

The efforts in mining include identify areas of opportunity for different resources, improving mine structures to prevent collapse. These efforts can be closely associated with other work in remote sensing to help locate resources and conduct environmental impact studies. The same efforts to improve structural developments in mines might also be applied to underground facilities. Materials and structural mechanics fields range from the macro level (geologic formations and superstructures) to the micro and nano level (e.g. particles, ligands, compounds, films, and nanowires). There are specific references of structural analyses being done for a *New-Concept Submarine* and *low noise torpedo*, as well as for solid rocket motors.

Systems, control theory, modeling, and simulation are closely associated with all other areas. They range from the macroscopic, such as improving trafficability movements of large vehicles, resources, people, and robotics to the microscopic, such as gene manipulation. They are being done for topics small and large in numbers, such as

tracking and/or controlling Unmanned Aerial Vehicles (UAVs) in a dense air traffic environment. Vibrational analysis is being performed with specific applications to missile launches on naval ships. Signal processing techniques are also closely related to these fields as well and incorporate wavelets, digital signal processing and neural networks. Applications of these studies include remote detection and biometrics.

Assessments, testing, and diagnostic methods include studies of text mining, Transmission Electron Microscopy (TEM), X-ray Diffraction (XRD), Magnetic Resonnance Imaging (MRI's), and other high precision diagnostic instrumentation which can be used in nuclear weapons development. Long range plans are made that include research, such as the specific reference to a new 5-year coal mining plan.

Communications related research studies topics such as fiber optics, optical comms in seawater, digital, wireless networks, mobile networks, millimeter waveguides, blind signature schemes in cryptography, and security protocols.

<u>Relative Research Investment Emphases between China and USA</u>

The relative frequency of China and USA research articles in the SCI for 2005 was computed. The difference in thematic emphasis between the USA and China is dramatic! China emphasizes the hard sciences that underpin defense and commercial needs. The USA emphasizes research areas focused on medical, psychological, and social problems. There are even research areas where China leads the USA in absolute numbers of research articles published. This means that, in those areas, China's relative investment strategy is greater than four times that of the USA.

A number of these detailed areas in which China places high emphasis are related to nanotechnology. A recent nanotechnology text mining study [Kostoff et al, 2006a] showed that China was second to the USA in nanotechnology research article productivity. This means that at the next level or two lower in aggregation, there could be nanotechnology sub-areas in which China was actually leading in absolute numbers of research article production, and also areas in which they were well behind the USA in absolute numbers of research article production. The present analysis confirms that hypothesis, and suggests that the USA should pay particular attention to those areas in which China has chosen to apply substantial relative emphases.

<u>Relative Technology Investment Emphases between China and the USA</u>

In the Engineering Compendex, as in the Science Citation Index, China's focus is on the hard sciences and especially engineering sciences, whereas the USA's relative focus is on health and biology-based research. In the overtly military-related terms (countermeasures, intrusion detection, missile), China has a commanding presence. One interesting exception is the presence of 'aeronautics' in the list of USA dominant terms. Similar anomalies have been noted in past studies. In technologies that require a large infrastructure, and therefore large investment, China has tended to be under-represented, and that probably accounts for the 'aerospace' under-emphasis.

Country Bibliometrics

What are the most utilized journals for China as a whole? The twenty journals containing the most Chinese articles for 2004-2005 appear to be concentrated in chemistry, materials, and physics, with one medical jounal. Many are Chinese journals.

What are the most prolific institutions? The twenty most prolific institutions for research articles are the Chinese Academy of Sciences in aggregate (all branches), followed by universities. The most prolific of the universities are Tsing Hua, Zhejiang, Peking, Shanghai Jiao Tong, and Hong Kong.

Which countries collaborate the most with China? The most collaborative countries with China, as reflected in the authors' country listing from SCI articles, are as follows:

China (118659); USA (9919); Japan (4247); Germany (2450); England (2295); Canada (1923); Australia (1811); France (1374); Singapore (1334); South Korea (1197); Taiwan (870); Russia (651); Italy (632); Sweden (626); India (623).

What is the citation impact of collaboration? Two cases were compared. The first case consisted of all research articles in the SCI published from 1995-1999 having at least one author with a Peoples Republic of China address. The second case consisted of all research articles in the SCI published from 1995-1999, retrieved using the following address query that essentially generates Chinese-only authored articles: (PEOPLES R CHINA NOT (USA OR JAPAN OR GERMANY OR HONG KONG OR (ENGLAND NOT NEW ENGLAND) OR CANADA OR ITALY OR FRANCE OR AUSTRALIA OR SOUTH KOREA OR TAIWAN OR NETHERLANDS OR SWEDEN OR RUSSIA OR INDIA OR SINGAPORE OR SWITZERLAND OR SPAIN OR BRAZIL OR SCOTLAND OR FINLAND OR MALAYSIA OR ROMANIA OR AUSTRIA)). These countries were the main research collaborators with China in the 1995-1999 time frame.

The first case (China and collaborators) produced the following results:

- Articles retrieved, 83689;
- Median citations of total articles retrieved, 2;
- Median citations of top ten cited articles retrieved, 604;
- Median citations of top 5% articles retrieved, 35.

The second case (China only) produced the following results:

- Articles retrieved, 62018;
- Median citations of total articles retrieved, 2;
- Median citations of top ten cited articles retrieved, 239;
- Median citations of top 5% articles retrieved, 25.

Thus, approximately one-quarter of research articles having at least one author with a China address were the result of China's collaboration with other countries. The impact of collaboration was negligible on median citations of the total. The impact of

collaboration was substantial on the top ten cited articles, and was noticeable on the top 5% of cited articles.

What are the main technical areas for collaboration? Two examples were selected: Chinese collaboration with the USA and with Japan. The two areas that stand out for both collaborative groups (China-USA; China-Japan) are biomedical and nanotechnology. However, when frequencies of similar phrases from each group are taken into account, for the China-USA articles, biomedical comes first and nanotechnology second. For the China-Japan articles, nanotechnology ranks higher relative to biomedical. Given China's relative (to the USA) investment strategy emphasis in nanotechnology, as will be shown later, and lesser relative investment emphasis in biomedical, the collaborative research relationship with Japan appears to be more quid pro quo than is the relationship with the USA.

Which journals are cited the most? The top ones cited most appear to be primarily English Language journals in contrast to many of the top most prolific journals being Chinese Journals. This suggests that at this time there may be a larger dependence on English Language (i.e. foreign) journals than on China's own internal journals, at least for Chinese papers published in journals accessed by the SCI.

The median Impact Factor of the nineteen journals containing the most papers cited by Chinese-authored papers is 5.45. This is contrasted with the median Impact Factor of the eighteen journals containing the most Chinese-authored papers (0.72). This order of magnitude difference in Impact Factor between the journals in which the Chinese researchers publish and the journals that they reference indicates Chinese researchers may not be publishing in the highest research impact journals. Since Impact Factor is discipline dependent, a discipline-based comparison of the overall Chinese results above (confined to those journals) may be instructive.

The median of the Impact Factors of the seven top physics journals in which the Chinese authors publish is 1.25, whereas the median of the Impact Factors of the seven top physics journals that they cite is 4.31, a factor of ~3.5 difference. The median of the Impact Factors of the three top chemistry journals in which they publish is 0.41, whereas the median of the Impact Factors of the seven top chemistry journals they cite is 3.46, a factor of nine difference. The median of the Impact Factors of the top six materials journals in which they publish is 0.49, whereas the Impact Factor of the top materials journal they cite is 1.71, a factor of ~3.5 difference. The top general science journal in which they publish has an Impact Factor of 0.68, whereas the three top general science journals they cite have a median Impact Factor of 31.86, a factor of more than forty difference. The top medical journal in which they publish has an Impact Factor of 0.46, while the top biology journal they cite has an Impact Factor of 6.36.

While these comparisons are for the top ~twenty journals only, and the Impact Factors have not been weighted by the numbers of papers in each journal, it is quite clear that, on average, the Chinese researchers are not publishing extensively in the high research impact journals they are referencing.

A slightly different journal Impact Factor comparison was made for the discipline of nanotechnology. To compare Impact Factors of journals in which Chinese authors publish nanotechnology papers with journals in which USA authors publish nanotechnology papers, a separate retrieval was made in mid-January 2006. The most recent 2000 articles that had at least one Chinese author but no authors from Japan, USA, Germany, France, South Korea, England, Russia, Italy, India, Spain, Taiwan, or Canada were retrieved, as were the most recent 2000 articles that had at least one USA author but no authors from Japan, China, Germany, France, South Korea, England, Russia, Italy, India, Spain, Taiwan, or Canada. The countries excluded are the major producers of nanotechnology research articles (Kostoff et al, 2006a). The purpose of this comparison is to identify Impact Factors of journals containing essentially intranational nanotechnology papers. For the eleven journals containing the most nanotechnology papers with USA authors, and the eleven journals containing the most nanotechnology papers with Chinese authors, the median Impact Factor of the USA journals is 3.9, whereas the median Impact Factor of the Chinese journals is 1.19, a difference of more than a factor of three.

To further place these numbers in perspective, an analysis was done to identify the journals cited by all nanotechnology researchers globally, emphasizing obvious Chinese journals. A study of the 2003 global nanotechnology literature retrieved over 21000 articles on nanotechnology (Kostoff et al, 2006a). Over 31000 journals were referenced in these articles.

There were 206 obvious Chinese journals listed (CHIN* or SINICA, in journal name). Most had one or two citations. There were a handful of Chinese journals that appeared significant, and even these had two orders of magnitude less citations than the leading international journals. Even though China's nanotechnology research article productivity was second to that of the USA (Kostoff et al, 2006a), most of its domestic journals in which these nanotechnology articles were published were receiving relatively negligible numbers of citations.

How does the quality of China's articles compare with that of other countries? Two examples were selected: India and Australia.

A citation comparison approach of papers published in selected technology areas was utilized. Phrases that appeared in each country's technical literature, and were of similar magnitude of occurrence, were selected.

<u>China-India Comparison</u>

Diverse technologies were selected to represent four major categories: Physical Sciences, Environmental Sciences, Material Sciences, Life Sciences. The phrases (technologies) were grouped by these major categories. The first group is Physical Sciences. Out of twenty phrases examined, representing diverse areas of physical sciences, China was a clear winner in fifteen (based on median number of top ten cited articles), India led in

one, and four were viewed as even. Clearly, China is the leader in Physical Sciences, based on top ten median numbers of citations.

The second group is Environmental Sciences. Out of ten phrases examined, China was the clear leader in seven, and three were considered even. Clearly, China is the leader in Environmental/ Agricultural Sciences.

The third group is Material Sciences. Out of ten phrases examined, China was the clear leader in seven, India was the clear leader in two, and one was considered even. Clearly, China is the leader in Material Sciences.

The fourth group is Life Sciences. Out of ten phrases examined, China was the clear leader in nine, and one was considered even. Clearly, China is the leader in Life Sciences.

Thus, China was the clear leader in each major category, although there were (isolated) instances where India led in a sub-technology area. It should be re-emphasized that this comparison did not examine relative investment strategies. It focused only on technical areas that had similar magnitudes of investment. It should also be emphasized that there can be many reasons why an article receives or does not receive citations (Kostoff, 1998b). These include intrinsic quality, research fundamentality (more fundamental articles receive, on average, more citations), and journal visibility. To identify which of these causation factors is operable, samples of articles would have to be retrieved, and each article examined in detail. Such an in-depth analysis was beyond the scope of the present study.

China-Australia Comparison

A diverse selection of phrases was made, to represent four major categories: Physical Sciences, Environmental Sciences, Engineering Sciences, Life Sciences. Out of eighteen phrases examined, representing diverse areas of Physical Sciences, Australia was a clear winner in eleven, a close winner in six, and tied with China in one. Australia is clearly the leader in Physical Sciences, based on top ten median numbers of citations.

The second group is Environmental/Agricultural Sciences. Out of fifteen phrases examined, Australia was the clear leader in all fifteen. Australia was an obvious winner over China in Environmental/Agricultural Sciences.

The third group is Engineering Sciences. Out of eleven phrases examined, Australia was the clear leader in six, a close leader in three, and was tied with China in two. Although Australia is the winner in Engineering Sciences, China's foucus on engineering and applied sciences can be seen, even compared to a first world country such as Australia.

The fourth group is Life Sciences. Out of sixteen phrases examined, Australia was the clear leader in all sixteen. This result is not only expected, but is further evidence that

China is currently putting relatively more research effort into engineering and applied sciences than any other category, especially Life Sciences.

Thus, Australia was the clear leader in each major category, although there were (isolated) instances where China was tied in a sub-technology area. It should be re-emphasized that this comparison did not examine relative investment strategies. It focused only on technical areas that had similar magnitudes of investment.

6. References

Blanpied, W. (ed.), "Proceedings of the Sino-US Forum on Basic Research for the Next Fifteen Years". 2002.

Bostian CW, Brandon WT, Mac Rae AU, Mahle CE, Townes SA . Key technology trends - Satellite systems. SPACE COMMUNICATIONS. 16 (2-3): 97-124 2000.

Campbell, R., H.D. Balzer, J. Berliner, R. Dobson, and P. Gregory. "Soviet Science and Technology," Foreign Applied Sciences Assessment Center, October 15, 1985.

Chinese Embassy, "Science and Technology Policy.".

Cox Report, House Report 105-851, "Report of the Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China," Rep.Christopher Cox of California, Chairman, United States Congress, 14 June 1999, http://www.access.gpo.gov/congress /house/hr105851.

Cutting DR, Karger DR, Pedersen JO, Tukey JW. Scatter/Gather: A cluster-based approach to browsing large document collections. In *Proceedings of the 15th International ACM SIGIR Conference on Research and Development in Information Retrieval* (SIGIR'92). 1992. 318-329.

Davidson, R.C., M.A. Abdou, L.A. Berry, C.W. Horton, J.F. Lyon, and P.H. Rutherford, Japanese Magnetic Confinement Fusion Research, Foreign Applied Sciences Assessment Center Technical Assessment Report, Science Applications International Corporation, 1990.

Duncan, L.M., F.T. Djuth, J.A. Fejer, N.C. Gerson, t. Hagfors, D.B. Newman, Jr., R.L. Showen "Soviet Ionospheric Modification Research," with, Foreign Applied Sciences Assessment Center, Technical Assessment Report 4040, 1988.

Garfield E. History of citation indexes for chemistry - a brief review. JCICS. 1985; 25(3): 170-174.

Gray, EM (Ed.), M. Cohn, L.W. Craver, A. Gersho, T. Lookabaugh, F. Pollara, and M. Vetterli *Non-US Data Compression and Coding Research*, , November 1993. A Foreign Applied Sciences Assessment Center (FASAC) report prepared for Science Applications International Corporation (SAIC) under U.S. Government sponsorship.

Guha S, Rastogi R, Shim K. CURE: An efficient clustering algorithm for large databases. In *Proceedings of the ACM-SIGMOD 1998 International Conference on Management of Data* (SIGMOD'98). 1998. 73-84.

Hearst MA. The use of categories and clusters in information access interfaces. In T. Strzalkowski (ed.), Natural Language Information Retrieval. Kluwer Academic Publishers. 2000.

Hsiung, D.I., "An Evaluation of China's Science and Technology System and its Impact on the Research Community.". 2002.

Hutubessy RCW, Hanvoravongchai P, Edejer TTT. Diffusion and utilization of magnetic resonance imaging in Asia. INTERNATIONAL JOURNAL OF TECHNOLOGY ASSESSMENT IN HEALTH CARE. 18 (3): 690-704 SUM 2002.

Jiang, Z., "Hold High the Great Banner of Deng Xiaoping Theory for An All-round Advancement of the Cause of Building Socialism with Chinese Characteristics into the 21st Century," Report delivered at the 15th National Congress of the Communist Party of China, 12 September 1997.

Karypis G, Han EH, Kumar V. Chameleon: A hierarchical clustering algorithm using dynamic modeling. IEEE Computer: Special Issue on Data Analysis and Mining. 1999. 32(8). 68--75.

Karypis G. CLUTO—A clustering toolkit. http://www.cs.umn.edu/˜cluto. 2005.

King DA, The scientific impact of nations. Nature 430 (6997): 311-316. July 15 2004.

Klinger, A., editor, Klinger, A., et. al., "Soviet Image Pattern Recognition Research," Jan. 1990, Foreign Applied Sciences Assessment Center, *Science Applications International Corp.*, 10260 Campus Point Drive, San Diego, CA 92121, and 1710 Goodridge Drive, McLean VA 22102.

Kostoff, R. N., "Database Tomography for Technical Intelligence: Comparative Analysis of the Research Impact Assessment Literature and the Journal of the American Chemical Society:, Scientometrics, 40:1, 1997.

Kostoff, R. N., Eberhart, H. J., and Toothman, D. R. "Database Tomography for Technical Intelligence: A Roadmap of the Near-Earth Space Science and Technology Literature". Information Processing and Management. 34:1. 1998a.

Kostoff RN. The use and misuse of citation analysis in research evaluation. Scientometrics 1998b; 43:1: 27-43.

Kostoff, R. N., Eberhart, H. J., and Toothman, D. R. "Hypersonic and Supersonic Flow Roadmaps Using Bibliometrics and Database Tomography". Journal of the American Society for Information Science. 50:5. 427-447. 15 April 1999.

Kostoff, R. N., Braun, T., Schubert, A., Toothman, D. R., and Humenik, J. "Fullerene Roadmaps Using Bibliometrics and Database Tomography". Journal of Chemical Information and Computer Science. 40:1. 19-39. Jan-Feb 2000a.

Kostoff, R. N., Green, K. A., Toothman, D. R., and Humenik, J. "Database Tomography Applied to an Aircraft Science and Technology Investment Strategy". Journal of Aircraft, 37:4. 727-730. July-August 2000b.

Kostoff, R. N. “The Underpublishing of Science and Technology Results”. The Scientist. 14:9. 6-6. 1 May 2000c.

Kostoff, R. N., and DeMarco, R. A. “Science and Technology Text Mining”. Analytical Chemistry. 73:13. 370-378A. 1 July 2001a.

Kostoff, R. N., Del Rio, J. A., García, E. O., Ramírez, A. M., and Humenik, J. A. “Citation Mining: Integrating Text Mining and Bibliometrics for Research User Profiling”. JASIST. 52:13. 1148-1156. 52:13. November 2001b.

Kostoff, R. N., Tshiteya, R., Pfeil, K. M., and Humenik, J. A. “Electrochemical Power Source Roadmaps using Bibliometrics and Database Tomography”. Journal of Power Sources. 110:1. 163-176. 2002.

Kostoff, R. N. “Text Mining for Global Technology Watch”. In Encyclopedia of Library and Information Science, Second Edition. Drake, M., Ed. Marcel Dekker, Inc. New York, NY. 2003a. Vol. 4. 2789-2799.

Kostoff, R. N. “The Practice and Malpractice of Stemming”. JASIST. 54: 10. June 2003b.

Kostoff, R. N., Shlesinger, M., and Malpohl, G. “Fractals Roadmaps using Bibliometrics and Database Tomography”. Fractals. 12:1. 1-16. March 2004a.

Kostoff, R. N., Shlesinger, M., and Tshiteya, R. "Nonlinear Dynamics Roadmaps using Bibliometrics and Database Tomography". International Journal of Bifurcation and Chaos. 14:1. 61-92. January 2004b.

Kostoff, R.N., Bedford, C.W., Del Rio, J. A ., Cortes, H., and Karypis, G. "Macromolecule Mass Spectrometry: Citation Mining of User Documents". Journal of the American Society for Mass Spectrometry. 15:3. 281-287. March 2004c.

Kostoff, R.N. "Scientific Impact of Nations". The Scientist. 27 September 2004d.

Kostoff, R. N., Buchtel, H., Andrews, J., and Pfeil, K. "The hidden structure of neuropsychology: Text Mining of the Journal *Cortex*: 1991-2001". Cortex. 41:2. 103-115. April 2005a.

Kostoff, R. N., Del Rio, J. A., Smith, C., Smith, A., Wagner, C.S., Malpohl, G., Karypis, G., and Tshiteya, R. "The Structure and Infrastructure of Mexico's Science and Technology". Technological Forecasting and Social Change. 72:7. August 2005b.

Kostoff, R. N., Karpouzian, G., and Malpohl, G. "Text Mining the Global Abrupt Wing Stall Literature". Journal of Aircraft. 42:3. 661-664. 2005c.

Kostoff, R. N., Tshiteya, R., Pfeil, K M., Humenik, J. A., and Karypis, G. "Power Source Roadmaps Using Database Tomography and Bibliometrics". Energy. 30:5. 709-730. 2005d.

Kostoff, R. N., and Block, J. A. "Factor Matrix Text Filtering and Clustering." JASIST. 56:9. 946-968. July. 2005e.

Kostoff, R. N., Stump, J.A., Johnson, D., Murday, J., Lau, C., and Tolles, W. "The Structure and Infrastructure of the Global Nanotechnology Literature". Journal of Nanoparticle Research. 8:1. 2006a.

Kostoff, R. N., Murday, J., Lau, C., and Tolles, W. "The Seminal Literature of Global Nanotechnology Research". Journal of Nanoparticle Research. 8:1. 2006b.

Lanzerotti,L.J., R. C. Henry, H. P. Klein, H. Masursky, G. A. Paulikas, F. L. Scarf, G. A. Soffen, and Y. Terzian, "Soviet Space Science Research," FASAC Technical Assessment Report FASAC-TAR-3060, Foreign Applied Sciences Assessment Center, 1986.

Leneman B . Automation In Soviet Industry, 1970-1983 - An Assessment Of The Present State Of Robot-Technology. Revue D Etudes Comparatives Est-Ouest. 15 (1): 75-112 1984.

MacRoberts M, MacRoberts B. Problems of citation analysis. Scientometrics 1996; 36(3): 435-444.

McIntire LV . WTEC panel report on tissue engineering (Reprinted). TISSUE ENGINEERING. 9 (1): 3-7 FEB 2003.

Mooney B, Seymour R . WTEC panels survey Russian maritime technologies. MARINE TECHNOLOGY SOCIETY JOURNAL. 30 (1): 71-72 SPR 1996.

MOST, "China's 10th Five Year Plan for Science and Technology.".

MOST, China Science and Technology Statistics Data Book 2003, http://www.most.gov.cn/eng/ statistics/2003/index.htm]

MOST, Science and Technology Indicators, 2002, Beijing: Scientific and Technical Documents Publishing House, 2005.

National Science Board (NSB), *Science and Engineering Indicators 2004.*

People's Daily Online, "Chinese President on Development of Science and Technology," *People's Daily Online*, 18 June 2000, http://english.peopledaily.com.cn/.

Prahalad CK, Hamel G. The core competence of the corporation. Harvard Business Review 68 (3): 79-91. May-Jun 1990.

Prechelt L, Malpohl G, Philippsen M. Finding plagiarisms among a set of programs with JPlag. Journal of Universal Computer Science. 2002. 8(11). 1016-1038.

Rasmussen E. Clustering Algorithms. In W. B. Frakes and R. Baeza-Yates (eds.). Information Retrieval Data Structures and Algorithms. 1992. Prentice Hall, N. J.

Rodan S, Galunic C. More than network structure: How knowledge heterogeneity influences managerial performance and innovativeness. Strategic Management Journal 25 (6): 541-562. 2004

Spencer, W.J., J.Y. Chen, A. Chiang, W. Frieman, E.S. Kuh, J.L. Moll, R.F. Pease, and K.C. Saraswat, "Chinese Microelectronics," Foreign Applied Sciences Assessment Center Technical Assessment Report, Science Applications International Corporation, April 1989.

Stares P . United-States And Soviet Military Space Programs - A Comparative-Assessment. Daedalus. 114 (2): 127-145 1985.

Steinbach M, Karypis G, Kumar V. A comparison of document clustering techniques. Technical Report #00--034. 2000. Department of Computer Science and Engineering. University of Minnesota.

Willet P. Recent trends in hierarchical document clustering: A critical review. Information Processing and Management. 1988. 24:577-597.

Wise MJ. String similarity via greedy string tiling and running Karb-Rabin matching. ftp://ftp.cs.su.oz.au/michaelw/doc/RKR_GST.ps, 1992. Dept. of CS, University of Sidney.

Xinhua, "China Rises to Third in Research, Development Spending," 3 November 2003, http://www1.chinadaily.com.cn/en/doc/2003-11/03/content_277967.htm.

Zamir O, Etzioni O. Web document clustering: A feasibility demonstration. In: Proceedings of the 19th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR'98). 1998. 46-54.

Zhao Y, Karypis G. Hierarchical clustering algorithms for document datasets Data Mining and Knowledge Discovery 10 (2): 141-168. 2005.

Appendicies

Appendix 1 – Selected Technology Bibliometrics

A1.1. Genetics

Based on the computational linguistics (document clustering) results, Genetics is an important area of Chinese research. The following simple query (Gene or genes or genetic NOT (genetic algor* or genetic programming)) was inserted into the Science Citation Index search engine, and 3996 records were retrieved for the period 2003-2005 (August). The bibliometrics analysis was performed on these retrieved records.

A1.1.1. Publication Statistics on Authors, Journals, Institutions, Countries

A1.1.1.1. Most Prolific Authors

Table A1-1 – Most Prolific Genetics Authors

AUTHOR	#PAPERS
Li--Y	86
Wang--J	82
Wang--Y	68
Zhang--Y	64
Zhang--J	56
Li--J	55
Chen--J	46
Wang--H	46
Zhang--L	46
Wang--L	44
Li--H	43
Liu--Y	40
Li--N	39
Liu--J	38
Li--L	37
Zhang--X	35
He--L	33
Deng--HW	32
Liu--B	32
Chen--Y	31

Because these names are short (all one syllable), and all but one have only a first initial, there tend to be multiple individuals/ institutions associated with each name. Therefore, little analyses of performers' names have been conducted in this report.

A1.1.1.2. Journals Containing Most Papers

Table A1-2 – Journals Containing Most Genetics Papers

JOURNAL	#PAPERS
Progress In Biochemistry And Biophysics	128
Chinese Medical Journal	98
Biochemical And Biophysical Research Communications	96
Chinese Science Bulletin	84
Acta Biochimica Et Biophysica Sinica	69
Journal Of Biological Chemistry	55
Acta Pharmacologica Sinica	44
Plant Science	42
International Journal Of Systematic And Evolutionary Microbiology	42
Journal Of Integrative Plant Biology	41
Science In China Series C-Life Sciences	38
Theoretical And Applied Genetics	32
Journal Of Forensic Sciences	31
Febs Letters	31
Acta Botanica Sinica	30
Protein Expression And Purification	30
Neuroscience Letters	27
Fems Microbiology Letters	26
Nucleic Acids Research	25
Cell Research	25

Six of the top 20 journals are Chinese. Most of the journals are fundamental research journals.

A1.1.1.3. Most Prolific Institutions

Table A1-3 – Most Prolific Genetics Institutions

INSTITUTION	#PAPERS
Chinese Acad Sci	763
Peking Univ	228
Zhejiang Univ	226
Univ Hong Kong	225
Fudan Univ	223
Chinese Acad Med Sci	145
Chinese Univ Hong Kong	141
Shanghai Jiao Tong Univ	121
China Agr Univ	116
Chinese Acad Agr Sci	106
Peking Union Med Coll	102
Sichuan Univ	90
Wuhan Univ	82
Huazhong Agr Univ	81
Tsing Hua Univ	78

Huazhong Univ Sci & Technol	66
Sun Yat Sen Univ	66
Shanghai Med Univ 2	62
Cent S Univ	62
Nanjing Med Univ	59

Seventeen of the top twenty institutions are universities, with the other three being variants of the Chinese Academy of Sciences. Four of these institutions are medical, and three are agricultural, reflecting the split between plant genetics and medical genetics.

A1.1.1.4. Most Prolific Countries

Table A1-4 – Most Prolific (Collaborative) Countries

COUNTRY	#ofPapers
Peoples R China	3996
USA	773
Japan	186
England	115
Germany	111
Canada	80
France	65
Australia	48
Netherlands	41
Singapore	38
Sweden	38
South Korea	35
Italy	21
Taiwan	20
Belgium	18
Switzerland	18
India	17
Denmark	16
Mexico	14
Finland	13

The USA stands out as the major collaborator, co-authoring almost twenty percent of the genetics articles. The next tier consists of Japan, England, and Germany.

A1.1.2. Citation Statistics on Authors, Journals, Documents

A1.1.2.1. Most Cited First Authors

Table A1-5 – Most Cited Genetics First Authors

AUTHOR	#CITES
Sambrook J	381

Thompson JD	223
Nei M	141
Chou KE	130
Felsenstein J	128
Altschul SF	125
Kumar S	109
Bradford MM	95
Saitou N	89
Swofford DL	81
Wang J	76
Li Y	75
Kimura M	73
Laemmli UK	69
Zhang Y	68
Deng HW	68
Wang L	67
Lander ES	65
Zhu J	61
Li J	60

This is a much different list from the most prolific authors. Less than half the names on this list are Chinese.

A1.1.2.2. Most Cited Journals

Table A1-6 – Most Cited Journals

JOURNAL	#CITES
P Natl Acad Sci USA	4592
J Biol Chem	3967
Nature	2886
Science	2853
Cancer Res	1913
Nucleic Acids Res	1867
Cell	1681
Theor Appl Genet	1312
J Virol	1234
Plant Physiol	1160
Plant Cell	1071
Biochem Bioph Res Co	1041
Mol Cell Biol	897
Oncogene	856
Nat Genet	847
Embo J	829
J Bacteriol	792
Genetics	788
Am J Hum Genet	776
Plant J	760

Most of these journals are front-line basic research journals, divided again into plant and medical genetics. In contrast to the journals containing the most articles, which contained six Chinese listings, none of the most cited journals are Chinese.

A1.1.2.3. Most Cited Documents

Table A1-7 – Most Cited Genetics Documents

DOCUMENT	TIMES CITED	TOTAL SCI
Sambrook J, 1989, Mol Cloning Lab Manu	226	291
Molecular Cloning Handbook		
Thompson JD, 1994, Nucleic Acids Res, V22, P4673	113	16654
Clustal-W - Improving The Sensitivity Of Progressive Multiple Sequence Alignment Through Sequence Weighting, Position-Specific Gap Penalties And Weight Matrix Choice		
Thompson JD, 1997, Nucleic Acids Res, V25, P4876	103	5958
The Clustal_X Windows Interface: Flexible Strategies For Multiple Sequence Alignment Aided By Quality Analysis Tools		
Bradford MM, 1976, Anal Biochem, V72, P248	92	> 65535
Rapid And Sensitive Method For Quantitation Of Microgram Quantities Of Protein Utilizing Principle Of Protein-Dye Binding		
Saitou N, 1987, Mol Biol Evol, V4, P406	87	12584
The Neighbor-Joining Method - A New Method For Reconstructing Phylogenetic Trees		
Altschul SF, 1997, Nucleic Acids Res, V25, P3389	79	14806
Gapped Blast And Psi-Blast: A New Generation Of Protein Database Search Programs		
Laemmli UK, 1970, Nature, V227, P680	66	> 65535

Cleavage Of Structural Proteins During Assembly Of Head Of Bacteriophage-T4		
Felsenstein J, 1985, Evolution, V39, P783	53	8766
Confidence-Limits On Phylogenies - An Approach Using The Bootstrap		
Kumar S, 2001, Bioinformatics, V17, P1244	52	1791
Mega2: Molecular Evolutionary Genetics Analysis Software		
Kimura M, 1980, J Mol Evol, V16, P111	47	4945
A Simple Method For Estimating Evolutionary Rates Of Base Substitutions Through Comparative Studies Of Nucleotide-Sequences		
Murashige T, 1962, Physiol Plantarum, V15, P473	46	22627
A Revised Medium For Rapid Growth And Bio Assays With Tobacco Tissue Cultures		
Chomczynski P, 1987, Anal Biochem, V162, P156	40	54550
Single-Step Method Of RNA Isolation By Acid Guanidinium Thiocyanate Phenol Chloroform Extraction		
Murray MG, 1980, Nucleic Acids Res, V8, P4321	39	2309
Rapid Isolation Of High Molecular-Weight Plant Dna		
Vos P, 1995, Nucleic Acids Res, V23, P4407	37	2856
Aflp - A New Technique For DNA-Fingerprinting		
Elbashir SM, 2001, Nature, V411, P494	35	2055
Duplexes Of 21-Nucleotide RNAs Mediate RNA Interference In Cultured Mammalian Cells		
Jefferson RA, 1987, Embo J, V6, P3901	32	3469
Gus Fusions - Beta-Glucuronidase As A Sensitive And Versatile Gene Fusion Marker In Higher-Plants		
Lander ES, 1987, Genomics, V1, P174	32	50

Identification Of Polymorphic Simple Sequence Repeats In The Genome Of The Zebrafish		
Eisen MB, 1998, P Natl Acad Sci USA, V95, P14863	31	3148
Cluster Analysis And Display Of Genome-Wide Expression Patterns		

In Table A1-7, the full or abbreviated document title is in '**bold**', following each citation. Two citation numbers are listed for each document. The first (TimesCited) is the total number of citations from the retrieved papers only. These can be viewed as Genetics-specific citations. The second (Total SCI) is the total number of citations received by the paper as listed in the SCI. They cover all succeeding years from the document publication date, and all disciplines.

None of these documents have a Chinese first author. Five of the documents are from 1980 or earlier. The more recent documents seem to focus on genetic mapping, while the older documents address the identification and growth of various organisms and their genetic makeup.

A1.1.2.4. Country Citation Comparisons.

Table A1-8 – Country Citation Comparisons

COUNTRY	#ARTICLES	MED TOT CITES	MED TOP TEN CITES	MED TOP 3% CITES
CHINA	766	4	140	85
USA	27362	20	1309	235
JAPAN	7764	12	731	152
INDIA	565	4	78	58

A comparison of citations was made between China's genetics papers and those of selected countries. In Table A1-8, the first column is the country of interest, the second column is the number of articles published in the SCI in the vintage year selected (1998), the third column is the median citations of all the articles published in the vintage year, the fourth column is the median number of citations of the top ten cited articles, and the fifth column is the median citations of the top three percent of articles. The last column was added to provide some level of normalization, given the large disparity of numbers of articles published among the different countries.

China is obviously far below the two advanced countries, but ahead of India, confirming the results of the country comparison with India shown in the main text. The reasons for

the differences are unclear. They could range from poor quality to more emphasis on narrower applications.

A1.2. ALLOYS

Based on the computational linguistics (document clustering) results, Alloys is an important area of Chinese research. The following simple query (alloy* OR alloys OR steel OR steels) was inserted into the Science Citation Index search engine, and 3994 records were retrieved for the period 2003-2005 (August). The bibliometrics was performed on these retrieved records.

A1.2.1. Publication Statistics on Authors, Journals, Institutions, Countries

A1.2.1.1. Most Prolific Authors

Table A1-9 – Most Prolific Alloys Authors

AUTHOR	#PAPERS
Wang--Y	49
Liu--Y	48
Hu--ZQ	43
Zhang--J	43
Du—YW	42
Zhang--Y	37
Li--Q	35
Wang--L	34
Wang—XL	33
Wu--GH	33
Li--Y	32
Wang--WH	32
Fu--HZ	31
Liu--L	31
Li--L	30
Wang--J	30
Wang--Q	30
Bian--XF	29
Shen--J	29
Liu--WM	28

A1.2.1.2. Journals Containing Most Papers

Table A1-10 – Journals Containing Most Alloys Papers

JOURNAL	#PAPERS
Rare Metal Materials And Engineering	254
Transactions Of Nonferrous Metals Society Of China	232

PRICM 5: The Fifth Pacific Rim International Conference On Advanced Materials And Processing, Pts 1-	228
Acta Metallurgica Sinica	190
Journal Of Alloys And Compounds	179
Materials Science And Engineering A-Structural Materials Properties Microstructure And Processing	178
Journal Of Materials Science & Technology	119
Materials Letters	98
Surface & Coatings Technology	94
Journal Of Rare Earths	79
Acta Physica Sinica	77
Intermetallics	66
Scripta Materialia	58
Journal Of Iron And Steel Research International	58
Materials Science And Technology	49
Journal Of Magnetism And Magnetic Materials	48
Journal Of Materials Science	48
Journal Of University Of Science And Technology Beijing	47
Applied Physics Letters	44
Physical Review B	42

Five of the journals are Chinese. Most are materials-oriented and mainly applied, with a few Physics journals appearing lower on the list. The second and third listings appear to be proceedings from Chinese conferences.

A1.2.1.3. Most Prolific Institutions

Table A1-11 – Most Prolific Alloys Institutions

INSTITUTION	#PAPERS
Chinese Acad Sci	735
Harbin Inst Technol	275
Tsing Hua Univ	263
Shanghai Jiao Tong Univ	245
Univ Sci & Technol Beijing	187
Xian Jiaotong Univ	141
Zhejiang Univ	139
Northwestern Polytech Univ	134
Shandong Univ	112
Northeastern Univ	108
Dalian Univ Technol	108
Cent Iron & Steel Res Inst	94
Hong Kong Polytech Univ	93
City Univ Hong Kong	89
Nanjing Univ	83
Shanghai Univ	77
Cent S Univ Technol	72
Beijing Univ Aeronaut & Astronaut	71

Jilin Univ	67
Huazhong Univ Sci & Technol	55

Out of 20 institutions listed, seventeen are universities.

A1.2.1.4. Most Prolific Countries

Table A1-12 – Most Prolific (Collaborative) Countries

COUNTRY	#PAPERS
Peoples R China	3994
Japan	182
USA	132
Germany	77
England	62
Australia	47
France	46
South Korea	40
Canada	27
India	27
Singapore	23
Sweden	17
Belgium	15
Italy	15
Netherlands	14
Russia	14
Taiwan	13
New Zealand	12
Austria	10
Spain	6

Japan and the USA are the two major collaborators. In contrast to the genetics discipline analyzed previously, the USA's share of joint papers decreases from almost twenty percent in genetics to less than four percent for alloys. Japan's share of joint papers in the two disciplines remains the same, at slightly under five percent.

A1.2.2. Citation Statistics on Authors, Journals, and Documents

A1.2.2.1. Most Cited First Authors

Table A1-13 – Most Cited First Alloys Authors

AUTHOR	TIMES CITED
Inoue A	470
Wang WH	129
Zhu YH	126

Sakai T	103
Kadir K	87
Zhang J	86
Li Y	79
Buschow KHJ	78
Lu K	77
Lu ZP	77
Liu Y	75
Pan HG	74
Zhang Y	74
Yerokhin AL	73
Kresse G	73
Gesmundo F	68
Chen J	67
Kim YW	67
Li Q	64
Massalski TH	64

A1.2.2.2. Most Cited Journals

Table A1-14 – Most Cited Alloys Journals

JOURNAL	#CITES
Mat Sci Eng A-Struct	2494
Phys Rev B	1989
J Alloy Compd	1975
Appl Phys Lett	1710
Acta Mater	1501
Surf Coat Tech	1365
J Appl Phys	1273
Scripta Mater	1109
Phys Rev Lett	818
Wear	799
J Mater Sci	794
J Electrochem Soc	787
Metall Mater Trans A	766
Acta Metall	745
J Magn Magn Mater	665
J Mater Res	579
Corros Sci	550
Mater T Jim	546
Metall Trans A	543
J Mater Process Tech	522

While there are still a relatively large number of materials journals listed as most cited, some physics journals do appear, especially Phys Rev B (the leader), J Appl Phys, Appl Phys Lett, and Phys Rev Lett. The top tier of most cited journals is at the applied end of the spectrum.

A1.2.2.3. Most Cited Documents

Table A1-15 – Most Cited Alloys Documents

PAPER	TIMES CITED	TOTAL SCI TIMES CITED
Inoue A, 2000, Acta Mater, V48, P279	61	571
Stabilization Of Metalic Supercooled Liquid And Bulk Amorphous Alloys		
Kohno T, 2000, J Alloy Compd, V311, L5	37	67
Hydrogen Storage Properties Of New Ternary System Alloys: La2mgni9, La5mg2ni23, La3mgni14		
Peker A, 1993, Appl Phys Lett, V63, P2342	31	917
A Highly Processable Metallic-Glass		
Willems JJG, 1984, Philips J Res S1, V39, P1	30	?
Unknown		
Johnson WL, 1999, Mrs Bull, V24, P42	30	315
Bulk Glass-Forming Metallic Alloys: Science And Technology		
Oliver WC, 1992, J Mater Res, V7, P1564	27	2366
An Improved Technique For Determining Hardness And Elastic-Modulus Using Load And Displacement Sensing Indentation Experiments		
Yerokhin AL, 1999, Surf Coat Tech, V122, P73	26	101
Plasma Electrolysis For Surface Engineering		
Sakai T, 1990, J Less-Common Met, V161, P193	26	183
Some Factors Affecting The Cycle Lives Of Lani5-Based Alloy Electrodes Of Hydrogen Batteries		
Turnbull D, 1969, Contemp Phys, V10, P473	26	534
Under What Conditions Can A Glass Be Formed		
Mordike BL, 2001, Mat Sci Eng A-Struct, V302, P37	26	129
Magnesium – Properties – Applications - Potential		

In Table A1-15, the full or abbreviated document title is in Bold, following each citation. Two citation numbers are listed for each document. The first (TimesCited) is the citations from the retrieved papers only. These can be viewed as Alloys-specific citations. The second (Total SCI) is the total citations received by the paper as listed in the SCI. They cover all succeeding years from the document publication date, and all disciplines.

Most of the highly-cited documents are very applied and material-specific.

There are a number of documents that deal with glass formation, and metal-glass formation and its processing. They are also much more recent than the other main research areas, with all but two of the Alloys papers being post-1990.

A1.2.2.4. Country Citation Comparisons

Table 1-16A – Alloys Country Citation Comparison

COUNTRY	#ARTICLES	MED TOT CITES	MED TOP TEN CITES	MED TOP 3% CITES
CHINA	1071	2	47	29
USA	2852	5	188	80
JAPAN	1994	3	128	50
INDIA	521	2	29	25

Again, China does not have the citation performance of the advanced countries, but out-performs India.

A1.3. CROPS

Based on the computational linguistics (clustering) results, Crops is a thrust area of Chinese research. Starting with the words generated by the clustering algorithm for the Crops cluster, an iterative feedback approach was used to generate the following comprehensive query for this research in China:

"(crop or crops or rice or wheat or (irrigation and soil) or sorghum or groundnut or maize or soybean or intercropping or sowing or grain yield or planting or tillage or millet or fruit or farmyard or agricultur* or potato) not (diet or diets or sensory or meals or dessert or fat* or frying or fried or (dried and fruit) or liver or diabetes or metabolism or arthritis or enteritis or fermentation or cancer or (heart and disease))"

The query was inserted into the Science Citation Index, and the most recent 3757 records were recovered for the period 2002-early 2005. The bibliometrics analysis was performed on these records.

A1.3.1. Publication Statistics on Authors, Journals, Institutions, Countries

A1.3.1.1. Most Prolific Authors

Table A1-17 – Most Prolific Crops Authors

AUTHOR	#PAPERS
Wang--J	62
Li--Y	54
Sun--XF	52
Zhang--Y	50
Zhang--FS	46
Sun--RC	45

Chen--SY	39
Zhu--YG	37
Zhang--JH	35
Zhang--L	34
Chen--J	32
Huang--Y	32
Li--L	32
Li--J	31
Liu--B	31
Zhu--LH	31
Wang--Y	29
Christie--P	28
Wang--H	27
Wu--P	26

The appearance of the non-Chinese surname Christie is interesting, and reflects a researcher at Queens University in Belfast who appears to work closely with Chinese researchers.

A1.3.1.2. Journals Containing Most Papers

Table A1-18 – Journals Containing Most Crops Papers

JOURNAL	#PAPERS
Acta Botanica Sinica	233
Chinese Science Bulletin	128
Theoretical And Applied Genetics	101
Journal Of Environmental Sciences-China	67
Pedosphere	64
Plant Science	62
Euphytica	61
Plant And Soil	60
Journal Of Plant Nutrition	55
Science In China Series C-Life Sciences	50
Chemosphere	48
Agricultural Water Management	45
Spectroscopy And Spectral Analysis	40
Journal Of Agricultural And Food Chemistry	38
Journal Of Integrative Plant Biology	34
Field Crops Research	32
Communications In Soil Science And Plant Analysis	32
Plant Breeding	31
Photosynthetica	30

Nutrient Cycling In Agroecosystems	28

Table A1-18 lists the 20 journals containing the most Crops papers. The top three journals stand out. Two of the top three top journals are Chinese. Both journals appear to be fundamental in nature. The rest of the journals appear to be much more applied in nature (e.g. Plant and Soil, Journal of Plant Nutrition, Agricultural Water Management, etc.)

A1.3.1.3. Most Prolific Institutions

Table A1-19 – Most Prolific Crops Institutions

INSTITUTION	#PAPERS
Chinese Acad Sci	1235
Zhejiang Univ	363
China Agr Univ	279
Chinese Acad Agr Sci	190
Nanjing Agr Univ	160
Wuhan Univ	119
Huazhong Agr Univ	111
Peking Univ	105
Lanzhou Univ	96
Fudan Univ	79
Univ Hong Kong	75
S China Agr Univ	75
Nanjing Univ	63
Tsing Hua Univ	61
S China Univ Technol	56
Beijing Normal Univ	56
Int Rice Res Inst	50
Hong Kong Baptist Univ	50
Nw Sci Tech Univ Agr & Forestry	44
China Natl Rice Res Inst	44

The 20 most prolific institutions are listed in Table A1-19. Most dominant is the Chinese Academy of Science. Sixteen of the institutions are universities, and the remaining four are research institutions. Five of the sixteen universities are agricultural universities specifically.

A1.3.1.4. Most Prolific Countries

Table A1-20 – Most Prolific (Collaborative) Countries

COUNTRY	#PAPERS
Peoples R China	3757
USA	471
Japan	249

Germany	120
Australia	110
Canada	90
England	64
Philippines	59
Netherlands	52
France	43
North Ireland	34
Israel	32
India	27
South Korea	26
Wales	26
Mexico	22
Sweden	19
Italy	16
Belgium	15
Switzerland	13

The USA is the dominant collaborator by far, followed by a second tier of Japan, Germany, Austrailia, and Canada.

A1.3.2. Citation Statistics on Authors, Journals, and Documents

A1.3.2.1. Most Cited First Authors

Table A1-21 – Most Cited Crops First Authors

AUTHOR	CITES
Sambrook J	241
Sun RC	158
Bradford MM	135
*Sas I	113
Lander ES	107
Zhu J	101
Mccouch SR	96
Li Y	95
Wang J	92
Feng MG	91
Yu J	87
Laemmli UK	81
Liu B	81
Li ZK	80
*Fao	80
Gao LZ	79
Zhang J	75
Murray MG	73
Murashige T	73

Altschul SF	72

The presence of Sun-RC, Li-Y, Wang-J, and Lui-B can be correlated with their appearance as first authors in the most cited documents list. However, unlike the most prolific authors list, where all but one of the surnames are Chinese, only about half the most cited authors have Chinese surnames.

A1.3.2.2. Most Cited Journals

Table A1-22 – Most Cited Crops Journals

JOURNAL	CITES
Plant Physiol	2753
Theor Appl Genet	2681
P Natl Acad Sci USA	1720
Plant Cell	1482
Science	1447
Nature	1271
Plant Soil	1194
Plant Mol Biol	1134
Crop Sci	1134
Plant J	1123
Soil Sci Soc Am J	906
Genetics	863
Planta	730
Physiol Plantarum	723
Annu Rev Plant Phys	680
Nucleic Acids Res	670
Acta Bot Sin	666
J Biol Chem	653
Soil Biol Biochem	619
J Environ Qual	617

There are no Chinese journals listed among the top 20 journals. There is a reasonable mix of basic and applied research journals, split between more general research journals such as Science and Nature, and more plant-oriented journals.

A1.3.2.3. Most Cited Documents

Table A1-23 – Most Cited Crops Documents

DOCUMENT	TIMES CITED	TOTAL SCI
Sambrook J, 1989, Mol Cloning Lab Manu	161	291
Molecular Cloning Manual		
Bradford MM, 1976, Anal Biochem, V72, P248	133	> 65535

Rapid And Sensitive Method For Quantitation Of Microgram Quantities Of Protein Utilizing Principle Of Protein-Dye Binding		
Yu J, 2002, Science, V296, P79	70	628
A Draft Sequence Of The Rice Genome (Oryza Sativa L. Ssp Indica)		
Murray MG, 1980, Nucleic Acids Res, V8, P4321	69	2309
Rapid Isolation Of High Molecular-Weight Plant Dna		
Lander ES, 1987, Genomics, V1, P174	69	3224
Mapmaker: An Interactive Computer Package For Constructing Primary Genetic Linkage Maps Of Experimental And Natural Populations.		
Laemmli UK, 1970, Nature, V227, P680	68	> 65535
Cleavage Of Structural Proteins During Assembly Of Head Of Bacteriophage-T4		
Murashige T, 1962, Physiol Plantarum, V15, P473	63	22627
A Revised Medium For Rapid Growth And Bio Assays With Tobacco Tissue Cultures		
Goff SA, 2002, Science, V296, P92	59	639
A Draft Sequence Of The Sequence Of The Rice Genome (Oryza Sativa L. Ssp Japonica)		
Temnykh S, 2000, Theor Appl Genet, V100, P697	49	160
Maping And Genome Organization Of Microsatellite Sequences In Rice (Oryza Sativa L.)		
Altschul SF, 1997, Nucleic Acids Res, V25, P3389	48	14806
Gapped Blast And Psi-Blast: An New Generation Of Protein Database Search Programs		
Harushima Y, 1998, Genetics, V148, P479	45	328
A High Density Rice Genetic Linkage Map With 2275 Markers Using A Single F-2 Population		
Causse MA, 1994, Genetics, V138, P1251	39	438
Saturated Molecular Map Of The Rice Genome Based On An Interspecific Backcross Population		
Blakeney AB, 1983, Carbohyd Res, V113, P291	39	984
A Simple And Rapid Preparation Of Alditol Acetates For Monosaccharide Analysis		
Hiei Y, 1994, Plant J, V6, P271	39	590
Efficient Transformation Of Rice (Oryza-Sativa L) Mediated By Agrobacterium And Sequence-Analysis Of The Boundaries Of The T-Dna		
Roder MS, 1998, Genetics, V149, P2007	37	439
A Microsatellite Map Of Wheat		
Vos P, 1995, Nucleic Acids Res, V23, P4407	35	2856
AFLP - A New Technique For DNA-Fingerprinting		
Doyle JJ, 1990, Focus, V12, P13	35	1625
Isolation Of Plant DNA From Fresh Tissue		

In Table A1-23, the full or abbreviated document title is in Bold, following each citation. Two citation numbers are listed for each document. The first (TimesCited) is the citations from the retrieved papers only. These can be viewed as Crop-specific citations. The second (Total SCI) is the total citations received by the paper as listed in the SCI. They cover all succeeding years from the document publication date, and all disciplines.

Three of the seventeen documents listed are pre-1980, and two more are very early 80's. The basic thrust of current research is focused on plant genomics and the DNA structure of plants, possibly for genetically- engineered plants.

A1.3.2.4. Country Citation Comparisons

Table AI-24 – Most Cited Crops Countries

COUNTRY	#ARTICLES	MED TOT CITES	MED TOP TEN CITES	MED TOP 3% CITES
CHINA	328	4	35	35
USA	4510	5	293	82
JAPAN	1014	5	89	55
INDIA	780	1	29	21

Again, China under-performs the advanced nations in citations, but out-performs India, even with India having more than double the publications output.

Appendix 2 – Partitional Clustering Method

CLUTO (Karypis, 2002) is a software package that implements various algorithms for clustering low- and high-dimensional datasets and for analyzing the characteristics of the various clusters. CLUTO implements three different classes of clustering algorithms that can operate either directly in the object's feature space or in the object's similarity space. The clustering algorithms provided by CLUTO are based on the partitional, agglomerative, and graph-partitioning paradigms. CLUTO's partitional and agglomerative algorithms are able to find clusters that are primarily globular, whereas its graph-partitioning and some of its agglomerative algorithms are capable of finding transitive clusters.

In this study, documents were clustered using the partitional clustering algorithms provided by CLUTO. Partitional clustering algorithms find the clusters by partitioning the entire document collection into a predetermined number of disjoint sets, each corresponding to a single cluster. This partitioning is achieved by treating the clustering process as an optimization procedure that tries to create high quality clusters according to a particular function that reflects the underlying definition of the "goodness" of the clusters. This function is referred to as the *clustering criterion function.* CLUTO implements seven such criterion functions that measure various aspects of intra-cluster similarity, inter-cluster dissimilarity, and their combinations, and have been shown to produce high-quality clusters in low- and high-dimensional datasets (Zhao and Karypis, 2005).

CLUTO uses two different methods for computing the partitioning clustering solution. The first method computes a *k*-way clustering solution via a sequence of repeated bisections, whereas the second method computes the solution directly (in a fashion similar to traditional *K*-means-based algorithms). These methods are often referred to as *repeated bisecting* and *direct k*-way clustering, respectively. CLUTO computes a direct *k*-way clustering as follows. Initially, a set of *k* objects is selected from the datasets to act as the *seeds* of the *k* clusters. Then, for each object, its similarity to these *k* seeds is computed, and it is assigned to the cluster corresponding to its most similar seed. This forms the initial *k*-way clustering. This clustering is then repeatedly refined so that it optimizes a desired clustering criterion function. This optimization is performed using a randomized incremental optimization algorithm that is greedy in nature, has low computational requirements, and produces high-quality solutions (Zhao and Karypis, 2005). A *k*-way partitioning via repeated bisections is obtained by recursively applying the above algorithm to compute 2-way clustering (*i.e*., bisections). Initially, the objects are partitioned into two clusters, then one of these clusters is selected and is further bisected, and so on. This process continues *k* - 1 times, leading to *k* clusters. Each of these bisections is performed so that the resulting two-way clustering solution optimizes a particular criterion function.

The actual documents were represented with the widely-used vector-space model. The various terms present in the documents were used to define a high-dimensional space and each document was considered to be a vector in that space. However, unlike the

traditional vector-space representation, which relies entirely on single terms, all consecutive two- and three-word combinations were taken into account, resulting in a representation that is capable of capturing the phrases commonly occurring in the documents. In addition, Porter's stemming algorithm was used to pre-process the various terms of each document prior to obtaining their vector-space representation. The weight of each dimension was computed using the TF-IDF model in which terms that occur many times within a document are given higher weight (TF) and terms that occur across many documents were given lower weight (IDF) (Zhao and Karypis, 2005). The similarity between two documents was measured using the cosine of their corresponding document vectors.

Appendix 3 – Cluto Clusters
-Science Citation Index
-256 Clusters
-2005 Data

There were 34834 records with Abstracts downloaded from the SCI for 2005. They were clustered into 256 groups by the CLUTO document clustering algorithm. The following summary of each cluster includes: cluster number, followed by number of Abstracts in that cluster (in parentheses), followed by the phrase roots with the highest numerical weighting, followed by a short summary description of the main cluster theme. Generally, the ordering of the clusters is by cohesiveness, the most cohesive being first.

<u>China Clusters</u>

Cluster 0: (59) sar 32.3%, cov 19.5%, sar.cov 16.0%, protein 3.2%, coronaviru 2.3%
Focuses on proteins, viruses, antibodies and vaccines related to SARS: (Severe Acute Respiratory Syndrome)

Cluster 1: (47) delai 10.2%, neural 9.5%, neural.network 8.8%, network 6.4%, exponenti 4.4%, exponenti.stabil 3.9%, global 3.1%, stabil 3.1%, global.exponenti 2.9%, global.exponenti.stabil 2.1%, time.delai 1.8%, lyapunov 1.4%, inequ 1.4%, suffici.condit 1.3%, suffici 1.2%, cellular.neural 1.1%, neural.network.time 1.0%, cellular.neural.network 1.0%, condit 1.0%, network.time 1.0%
Focuses on the stability of delayed neural networks, particularly cellular neural networks, with emphasis on global exponential stability

Cluster 2: (50) cnt 66.1%, nanotub 4.3%, carbon.nanotub 3.6%, carbon 3.2%, nanotub.cnt 3.1%, carbon.nanotub.cnt 3.0%
Focuses on carbon nanontubes, especially their synthesis and structure

Cluster 3: (27) cach 51.8%, proxi 4.2%, video 3.2%, scheme 2.7%, proxi.cach 2.3%, server 2.2%, stream 2.0%, multicast 1.5%, vod 1.5%, client 1.2%, stream.media 1.0%, multimedia 1.0%
Focuses on caching schemes and caches, especially proxy caches, as they relate to media streaming on networks and servers

Cluster 4: (54) signatur 33.9%, scheme 25.3%, signatur.scheme 6.9%, proxi 2.6%, secur 2.6%, signer 2.4%, messag 2.3%, proxi.signatur 2.0%, blind.signatur 1.1%
Focuses on signature and signature schemes, including proxy signature schemes, for data encryption

Cluster 5: (57) black.hole 26.7%, black 21.2%, hole 16.2%, entropi 4.6%, horizon 3.1%, scalar 1.1%, quasinorm 1.0%, brick.wall 1.0%
Focuses on black holes and black hole horizons, with emphasis on their associated entropy.

Cluster 6: (33) solder 40.1%, undercool 12.1%, imc 4.1%, alloi 2.1%, solidif 1.9%, eutect 1.9%, dendrit 1.7%, solder.alloi 1.5%, solder.joint 1.5%, reflow 1.3%, interfac 1.1%
Focuses on solder and solder joints, particularly lead free solder, with emphasis on solidification, structure, and properties.

Cluster 7: (35) video 63.7%, text 2.4%, segment 1.7%, sport 1.6%, sport.video 1.6%, watermark 1.4%, mpeg 1.2%
Focuses on video, especially sports video, with emphasis on watermarking.

Cluster 8: (72) bifurc 56.8%, hopf 7.0%, hopf.bifurc 5.4%, delai 2.1%, period 2.1%, period.solut 1.1%
Focuses on bifurcation, especially Hopf bifurcation.

Cluster 9: (50) ionic.liquid 26.6%, ionic 17.9%, liquid 9.7%, bmim 5.8%, liquid.bmim 2.3%, ionic.liquid.bmim 2.3%, reaction 1.9%, bf4 1.7%, methylimidazolium 1.3%, yield 1.1%, butyl.methylimidazolium 1.0%, pf6 1.0%
Focuses on ionic liquids, especially BMIM: (butyl methylimidazolium), with emphasis on its use as a reaction medium and promoter to increase reaction yields.

Cluster 10: (40) peer 29.6%, p2p 10.4%, network 8.2%, topolog 6.7%, peer.peer 6.0%, overlai 2.8%, p2p.network 2.1%, search 1.5%, node 1.5%, chord 1.3%, rout 1.3%, queri 1.2%, peer.network 1.0%, peer.peer.network 1.0%
Focuses on peer to peer: (P2P) networks and file-sharing systems, with emphasis on their topology and topological mismatches.

Cluster 11: (67) zno 62.2%, nanorod 5.1%, zno.nanorod 3.4%, zno.nanostructur 3.0%, nanostructur 2.3%, zinc 1.1%
Focuses on ZnO, especially ZnO nanorods, with emphasis on their synthesis and structure

Cluster 12: (67) martensit 21.6%, transform 9.6%, martensit.transform 8.4%, alloi 8.2%, shape.memori 5.7%, memori 4.1%, shape.memori.alloi 2.9%, memori.alloi 2.9%, transform.temperatur 2.8%, temperatur 2.8%, shape 1.9%, sma 1.4%, martensit.transform.temperatur 1.3%, phase 1.1%, phase.transform 1.1%, tini 1.0%
Focuses on martensitic transformation temperatures, particularly of shape memory alloys

Cluster 13: (104) fuzzi 72.8%, control 2.6%, fuzzi.control 2.3%, system 1.3%
Focuses on mathematically fuzzy concepts, including fuzzy control, fuzzy models, fuzzy logic, etc.

Cluster 14: (103) grid 56.6%, resourc 7.2%, comput 4.4%, grid.comput 2.7%, servic 2.0%, schedul 1.5%, architectur 1.0%
Focuses on Grid Computing, a system for computer resource sharing.

Cluster 15: (111) entangl 58.8%, state 6.4%, entangl.state 4.3%, quantum 4.2%, scheme 1.3%, teleport 1.2%
Focuses on quantum entanglement and entanglement states.

Cluster 16: (83) graph 56.5%, vertic 7.7%, bar 3.2%, vertic.bar.vertic 2.0%, bar.vertic.bar 2.0%, bar.vertic 2.0%, edg 1.9%, vertex 1.4%, conjectur 1.2%, connect 1.0%
Focuses on graphs and curves, especially theories and proofs involving them.

Cluster 17: (229) angstrom 62.1%, degre 3.5%, crystal 2.1%, beta 2.0%, angstrom.beta 1.9%, monoclin 1.7%, space.group 1.6%, ref 1.5%
Focuses on crystallographic structures and space groups, especially determination of unit cell dimensions: (designated as a, b, and c) in angstroms.

Cluster 18: (59) beta 22.9%, glucopyranosyl 8.1%, beta.glucopyranosyl 7.5%, glucopyranosid 7.4%, beta.glucopyranosid 5.1%, isol 3.6%, glycosid 1.9%, compound 1.5%, spectroscop 1.5%, hydroxi 1.3%, new 1.3%, elucid 1.3%, alpha 1.3%, beta.glucopyranosyl.beta 1.2%, glucopyranosyl.beta 1.2%, glucosid 1.2%, structur.elucid 1.1%
Focuses on glucopyranosyl, especially isolation of chemical compounds containing glucopyranosyl.

Cluster 19: (66) symmetri 14.5%, conserv 10.4%, invari 9.3%, lie 5.0%, lie.symmetri 4.1%, noether 3.8%, form.invari 3.6%, equat 3.0%, system 2.7%, infinitesim 2.4%, infinitesim.transform 2.3%, hojman 1.7%, noether.conserv 1.6%, non.noether 1.5%, conserv.law 1.5%, non.noether.conserv 1.2%, transform 1.1%, law 1.1%
Focuses on system symmetries, especially Lie symmetries and non-Noether conserved quantities.

Cluster 20: (116) crack 58.6%, stress 3.4%, intens.factor 2.2%, crack.tip 1.9%, tip 1.5%, stress.intens 1.2%, stress.intens.factor 1.2%, fractur 1.0%, load 1.0%
Focuses on cracking, crack tip growth rates, and stress intensity factors of materials.

Cluster 21: (125) nanotub 59.2%, carbon.nanotub 14.8%, carbon 9.1%
Focuses on nanotubes, especially synthesis of carbon nanotubes.

Cluster 22: (46) antenna 34.3%, microstrip 5.7%, bandwidth 5.6%, patch 3.0%, slot 2.5%, patch.antenna 2.1%, ebg 1.9%, band 1.7%, ground.plane 1.7%, radiat 1.6%, imped 1.3%, imped.bandwidth 1.2%, frequenc 1.1%, ground 1.0%, pbg 1.0%
Focuses on antennas, particularly patch antennas, with emphasis on their design and characterization.

Cluster 23: (80) sar 37.1%, patient 6.0%, acut 3.5%, syndrom 3.0%, respiratori 2.7%, acut.respiratori 2.5%, sever.acut.respiratori 2.3%, sever.acut 2.3%, acut.respiratori.syndrom 2.1%, respiratori.syndrom 2.1%, sar.patient 2.0%, sever 1.8%,

cov 1.6%, outbreak 1.4%, syndrom.sar 1.4%, respiratori.syndrom.sar 1.4%, infect 1.3%, coronaviru 1.1%, sar.cov 1.1%, flap 1.0%
Focuses on SARS: (Severe Acute Respiratory Syndrome), particularly studies involving SARS patients, cases and outbreaks.

Cluster 24: (87) alloi 35.0%, hydrogen 6.7%, hydrogen.storag 4.1%, capac 3.5%, discharg 3.3%, electrochem 2.6%, mill 2.5%, storag 2.3%, discharg.capac 1.8%, hydrid 1.7%, phase 1.7%, storag.alloi 1.1%, hydrogen.storag.alloi 1.1%, cycl 1.0%
Focuses on alloy synthesis and electrochemical characterization, with emphasis on characterization of hydrogen storage and discharge capacity.

Cluster 25: (66) grate 32.8%, fiber 8.6%, bragg 6.0%, bragg.grate 5.2%, fbg 5.1%, wavelength 4.0%, fiber.bragg.grate 3.3%, fiber.bragg 3.3%, sensor 1.4%
Focuses on gratings, especially fiber Bragg gratings: (FBGs), with emphasis on their development as sensors and optical elements.

Cluster 26: (69) nanocomposit 36.4%, clai 8.9%, mmt 7.1%, ommt 4.6%, montmorillonit 4.0%, intercal 2.5%, exfoli 2.1%, clai.nanocomposit 1.2%
Focuses on synthesis of nanocomposites, particularly polymer/clay nanocomposites containing montmorillonite: (MMT).

Cluster 27: (55) corros 62.6%, steel 2.7%, corros.resist 1.7%, pit 1.5%, eros 1.3%, resist 1.3%, implant 1.1%, stainless.steel 1.1%, stainless 1.0%
Focuses on corrosion and pitting resistance of metals and alloys, including steels and stainless steels.

Cluster 28: (75) eu3 31.9%, phosphor 19.6%, emiss 3.5%, luminesc 3.3%, excit 2.4%, eu2 2.2%, dope 1.7%, eu3.ion 1.5%, ion 1.4%
Focuses on Europium ion: (Eu^{3+} and Eu^{2+}) doped phosphors, especially their synthesis and characterization, with emphasis on luminescent properties.

Cluster 29: (143) speci 35.2%, new.speci 19.2%, genu 8.4%, china 6.2%, new 6.1%, speci.genu 1.8%, new.scienc 1.0%
Focuses on the identification of mainly zoological and entomological species in China.

Cluster 30: (71) chaotic 32.9%, synchron 11.3%, chaotic.system 9.0%, system 5.8%, chao 4.0%, control 3.7%, feedback 1.7%, chua 1.3%
Focuses on chaotic systems, especially their control and synchronization.

Cluster 31: (166) nanowir 68.2%, arrai 2.1%, nanowir.arrai 1.6%, diamet 1.6%
Focuses on nanowires, especially their synthesis and characterization.

Cluster 32: (78) ring 31.3%, titl 5.9%, titl.compound 5.8%, dihedr.angl 4.0%, dihedr 4.0%, compound 3.6%, benzen.ring 2.8%, conform 2.1%, molecul 1.9%, angl 1.8%, benzen 1.8%, boat 1.3%, bond 1.1%

Focuses on compounds and molecules containing rings, such as benzene rings, with emphasis on their synthesis and characterization.

Cluster 33: (56) mcm 38.9%, molecular.siev 6.2%, siev 5.5%, mesopor 4.4%, catalyst 4.1%, sapo 3.5%, acid 1.6%, molecular 1.5%, select 1.3%, catalyt 1.2%
Focuses on molecular sieves, especially those comprised of MCMs: (mesoporous crystalline materials), with emphasis on their synthesis and characterization.

Cluster 34: (68) ca2 57.2%, channel 3.0%, intracellular 1.8%, calcium 1.3%, cell 1.2%
Focuses on the calcium ion, Ca+2, particulary as it relates to cells and cellular functions.

Cluster 35: (114) er3 13.1%, upconvers 8.8%, emiss 6.9%, glass 6.4%, yb3 5.4%, dope 3.6%, excit 2.2%, luminesc 1.7%, laser 1.5%, tm3 1.4%, absorpt 1.3%, crystal 1.2%, er3.dope 1.1%, fluoresc 1.1%, tellurit 1.1%, intens 1.0%, lifetim 1.0%
Focuses on glasses containing Er3+, especially for upconversion laser applications.

Cluster 36: (91) face 30.5%, recognit 27.6%, face.recognit 5.0%, featur 2.7%, imag 1.9%, discrimin 1.9%, face.imag 1.1%, gabor 1.1%
Focuses on face recognition algorithms.

Cluster 37: (81) quark 48.8%, meson 5.8%, nucleon 3.4%, mass 3.3%, gluon 1.6%, chiral 1.4%, qcd 1.0%
Focuses on quarks and quark models.

Cluster 38: (255) atom 22.4%, ligand 5.4%, titl 5.0%, two.atom 3.8%, coordin 2.9%, atom.two 2.6%, two 2.4%, distort 2.3%, geometri 2.2%, titl.compound 2.1%, molecul 2.0%, octahedr 1.6%, h2o 1.2%, bond 1.2%, compound 1.1%, water.molecul 1.0%, distort.octahedr 1.0%, complex 1.0%, carboxyl 1.0%
Focuses on the atomic structure of molecules and compounds.

Cluster 39: (69) diamond 27.1%, deposit 13.4%, diamond.film 10.9%, film 9.4%, substrat 3.0%, cvd 1.4%
Focuses on diamond films, including nano-structured diamond films, with emphasis on their deposition by various methods.

Cluster 40: (66) schedul 30.5%, algorithm 8.1%, job 5.8%, time 4.7%, machin 3.2%, process.time 2.5%, minim 2.5%, process 2.0%, makespan 1.4%, schedul.algorithm 1.0%, optim 1.0%
Focuses on machine scheduling and optimization, with emphasis on algorithms that deal with these subjects.

Cluster 41: (101) soliton 37.1%, soliton.solut 7.9%, equat 5.4%, solut 5.3%, nonlinear 2.1%, dimension 1.7%, variabl.separ 1.3%, variabl 1.2%, perturb 1.0%
Focuses on solitons: (waves), especially equations and solutions related to them.

Cluster 42: (79) delai 4.9%, matrix.inequ 4.2%, robust 4.1%, system 4.0%, inequ 3.8%, stabil 3.1%, linear.matrix.inequ 3.1%, linear.matrix 3.0%, linear 2.6%, feedback 2.6%, control 2.4%, design 2.3%, lmi 1.8%, matrix 1.8%, output 1.7%, suffici 1.5%, suffici.condit 1.5%, feedback.control 1.5%, time.delai 1.5%, output.feedback 1.4%, close.loop 1.2%, uncertainti 1.1%, time 1.1%, loop 1.0%, condit 1.0%
Focuses on control of linear systems, especially related to time delay and feedback control.

Cluster 43: (89) alloi 32.7%, amorph 15.3%, amorph.alloi 7.3%, magnet 5.3%, glass 3.2%, glass.form 2.2%, crystal 1.3%
Focuses on characterization of alloys, especially amorphous alloys, with emphasis on high temperature and magnetic properties.

Cluster 44: (62) glass 50.0%, bmg 3.4%, metal.glass 2.2%, glass.transit 1.7%, bulk.metal 1.4%, bulk.metal.glass 1.4%, crystal 1.2%, nucleat 1.0%
Focus on glasses, especially metallic glasses, with emphasis on synthesis and characterization of properties such as glass transition temperature.

Cluster 45: : (66) fiber 60.4%, concret 5.8%, strength 1.8%, reinforc 1.2%
Focuses on fibers, especially fibers for composites and concrete reinforcement, with emphasis on their syntheis and characterization.

Cluster 46: (155) dielectr 33.1%, ceram 12.8%, dielectr.constant 6.5%, dielectr.properti 4.0%, sinter 3.3%, constant 3.0%, microwav 1.8%, temperatur 1.4%, microwav.dielectr 1.2%, properti 1.2%
Focuses on characterization of the dielectric properties of ceramics.

Cluster 47: (52) dna 29.4%, immobil 17.4%, nucleic 5.2%, nucleic.acid 4.7%, enzym 2.0%, acid 1.3%, immobil.enzym 1.0%, calf.thymu 1.0%
Focuses on DNA, particularly the immobilization of DNA, and enzymes.

Cluster 48: : (79) cancer 18.8%, risk 18.4%, genotyp 6.4%, polymorph 4.5%, escc 1.6%, gastric 1.4%, lung.cancer 1.4%, lung 1.3%, control 1.1%, case 1.1%, cancer.risk 1.0%, allel 1.0%
Focuses on cancer risk and control.

Cluster 49: (113) period 12.1%, period.solut 10.8%, posit.period 4.2%, exist 3.9%, posit.period.solut 3.7%, delai 3.0%, solut 2.9%, predat 2.8%, prei 2.2%, equat 2.1%, impuls 1.8%, differenti.equat 1.7%, coincid.degre 1.5%, suffici.condit 1.5%, theorem 1.4%, suffici 1.4%, differenti 1.1%, posit 1.0%, exist.posit.period 1.0%, continu.theorem 1.0%, predat.prei 1.0%, stabil 1.0%
Focuses on positive periodic solutions to system equations.

Cluster 50: : (144) titl.compound 15.3%, titl 13.2%, compound 9.5%, intermolecular 5.4%, bond 5.1%, molecul 5.0%, hydrogen 4.5%, hydrogen.bond 3.2%, intermolecular.hydrogen 2.8%, crystal 1.8%, crystal.structur 1.5%,

intermolecular.hydrogen.bond 1.3%, intramolecular 1.2%, interact 1.1%, intramolecular.hydrogen 1.0%
Focuses on compounds containing intramolecular hydrogen bonds, with emphasis on their structure.

Cluster 51: (116) web 26.7%, semant 15.6%, servic 13.9%, ontolog 11.6%, web.servic 3.6%, inform 2.1%
Focuses on web services, especially focused on semantic Web aspects.

Cluster 52: (91) mwnt 13.3%, swnt 12.9%, carbon 11.4%, nanotub 8.6%, carbon.nanotub 6.7%, wall.carbon 5.2%, wall.carbon.nanotub 4.8%, wall 3.2%, singl.wall.carbon 2.0%, singl.wall 2.0%, mwcnt 1.3%, tube 1.3%
Focuses on single-wall and multi-wall carbon nanotubes; includes studies that focus on their synthesis, characterization, and use in reactions involving other materials.

Cluster 53: (104) polymorph 10.9%, genotyp 10.4%, allel 10.3%, snp 4.3%, haplotyp 4.3%, schizophrenia 4.0%, gene 3.8%, chines 3.0%, popul 2.1%, hypertens 1.8%, han 1.7%, subject 1.5%, bmd 1.1%, frequenc 1.1%, patient 1.0%
Focuses on specific types of genes, especially polymorphs, and their functions.

Cluster 54: (76) gold 17.8%, sam 8.7%, electrod 5.7%, assembl 3.0%, self.assembl 2.8%, monolay 2.7%, immunosensor 2.6%, surfac 2.2%, gold.nanoparticl 2.1%, electrochem 1.9%, gold.electrod 1.7%, assembl.monolay 1.7%, self.assembl.monolay 1.7%, nanoparticl 1.6%, self 1.5%, immobil 1.3%, antibodi 1.1%
Focuses on devices containing or utilizing gold, with emphasis on electrodes, especially self-assembled monolayers: (SAMs), and biosensors.

Cluster 55: (135) solut 17.7%, wave 9.0%, equat 8.4%, wave.solut 7.6%, exact 3.1%, nonlinear 3.0%, solitari 2.8%, ellipt 2.8%, solitari.wave 2.7%, ellipt.function 2.6%, exact.solut 2.1%, jacobi.ellipt 1.9%, jacobi 1.6%, solitari.wave.solut 1.6%, jacobi.ellipt.function 1.4%, function 1.3%, period 1.1%
Focuses on exact solutions, including solitary wave solutions, to various equations and functions.

Cluster 56: : (76) devic 12.7%, emit 6.2%, layer 5.9%, light.emit 4.0%, alq 3.7%, ito 3.3%, ol 3.1%, hole 2.8%, organ 2.7%, npb 2.3%, light 2.3%, organ.light 2.2%, organ.light.emit 2.0%, lumin 1.2%, emiss 1.2%, light.emit.devic 1.0%, emit.devic 1.0%, effici 1.0%
Focuses on devices, especially organic light emitting devices, including light emitting diodes: (LEDs), with emphasis on their fabrication.

Cluster 57: (147) rock 9.9%, zircon 7.1%, ag 5.3%, mantl 4.5%, granit 3.8%, metamorph 3.5%, isotop 2.6%, basalt 1.9%, similar 1.5%, north 1.4%, crust 1.4%, geochem 1.3%, magma 1.1%, date 1.1%, subduct 1.1%, ree 1.1%, gneiss 1.0%, magmat 1.0%

Focuses on rock and mantle beneath North China, with emphasis on isotope dating.

Cluster 58: (235) soil 70.6%, fertil 1.4%
Focuses on soil, especially the effects of soil properties on plants, in China

Cluster 59: (90) transgen 25.3%, plant 11.8%, gene 11.4%, express 4.0%, transgen.plant 2.0%, tobacco 1.9%, gu 1.8%, transform 1.5%
Focuses on transgenic experiments, especially those involving transgenic plants.

Cluster 60: (43) wavelet 52.9%, signal 2.3%, denois 1.4%, wavelet.transform 1.4%, multiresolut 1.4%, frame 1.3%, fault 1.2%, transform 1.0%
Focuses on wavelets.

Cluster 61: (147) wear 41.9%, friction 8.9%, wear.resist 3.0%, steel 2.7%, slide 2.2%, surfac 1.6%, lubric 1.6%, composit 1.6%, resist 1.6%, coat 1.1%, friction.coeffici 1.0%
Focuses on wear resistance of materials, especially experimental evaluation of wear resistance properties.

Cluster 62: (120) film 19.9%, thin.film 8.5%, thin 7.3%, ferroelectr 6.4%, dielectr 4.2%, bst 3.4%, pzt 3.3%, anneal 2.4%, temperatur 1.2%, deposit 1.1%
Focuses on films, especially thin films, with emphasis on their synthesis and evaluation.

Cluster 63: : (138) neural.network 22.4%, neural 21.8%, network 16.7%, ann 5.7%, artifici.neural.network 2.0%, artifici.neural 2.0%, model 2.0%, train 1.6%, artifici 1.4%, network.ann 1.0%
Focuses on neural networks, especially artificial neural networks: (ANNs).

Cluster 64: (82) capillari 11.6%, separ 8.3%, buffer 5.3%, electrophoresi 3.8%, detect 3.3%, mmol 3.2%, capillari.electrophoresi 2.3%, analyt 2.1%, acid 1.5%, chiral 1.3%, run.buffer 1.3%, voltag 1.2%, concentr 1.1%, electrokinet 1.0%, run 1.0%
Focuses on chemical separation methods, especially those based on capillary electrophoresis: (CE).

Cluster 65: (59) cure 24.3%, resin 16.1%, epoxi 5.0%, flame.retard 4.7%, retard 3.6%, flame 3.5%, thermal 2.1%, epoxi.resin 1.5%, thermal.degrad 1.1%, degrad 1.1%
Focuses on curing and resins, with emphasis on curing of resins.

Cluster 66: (69) resourc 42.2%, agent 7.1%, digit 3.9%, mobil.agent 3.2%, librari 2.7%, digit.librari 2.3%, system 2.2%, architectur 1.8%, mobil 1.7%, inform 1.1%
Focuses on resource management, especially as it relates to computer networks, with emphasis on mobile agents and digital libraries

Cluster 67: : (67) gev 14.4%, collis 8.0%, pion 4.1%, hadron 3.5%, parton 3.1%, transvers 2.6%, momentum 2.3%, product 2.2%, collid 2.0%, transvers.momentum 1.9%, quark 1.6%, gluon 1.4%, bar 1.3%, lhc 1.3%, pseudorapid 1.2%, jet 1.0%

Focuses on energy levels in the GeV range; especially energies related to the motion and interaction of sub-atomic particles.

Cluster 68: (174) tio2 54.3%, photocatalyt 6.3%, anatas 2.2%, photocatalyst 1.7%, photocatalyt.activ 1.6%, sol 1.3%, dope 1.0%, gel 1.0%
Focuses on TiO2, especially its photocatalytic behavior.

Cluster 69: (96) secur 43.6%, protocol 9.3%, attack 4.5%, authent 4.0%, scheme 2.0%, kei 1.4%, encrypt 1.2%, commun 1.2%, messag 1.0%
Focuses on security, especially system and protocol security.

Cluster 70: (171) crystal 9.8%, space.group 7.6%, space 3.7%, angstrom 3.4%, degre 3.0%, group 2.9%, beta 2.5%, monoclin 2.4%, complex 2.3%, system.space.group 2.1%, system.space 2.1%, compound 1.8%, structur 1.7%, 000 1.6%, singl.crystal 1.5%, rai 1.4%, crystal.structur 1.4%, diffract.crystal 1.3%, diffract 1.0%
Focuses on the characterization of crystal structures, especially space groups.

Cluster 71: (78) aldehyd 30.2%, aromat.aldehyd 7.0%, aromat 5.6%, keton 3.6%, yield 3.1%, condens 2.2%, reaction 2.2%, solvent.free 1.5%, aldehyd.keton 1.4%, synthesi 1.2%
Focuses on aldehydes, especially aromatic aldehydes, with emphasis on reactions involving them.

Cluster 72: (115) algebra 56.1%, lie 2.8%, lie.algebra 2.2%, modul 2.0%, loop.algebra 1.4%, hierarchi 1.4%, let 1.3%
Focuses on algebras, especially Lie algebra and loop algebra.

Cluster 73: (111) copolym 40.7%, poli 6.3%, block 3.9%, block.copolym 2.7%, polymer 1.8%
Focuses on polymers, especially block copolymers, with emphasis on their synthesis.

Cluster 74: (325) coat 68.6%, sprai 1.6%, oxid 1.3%, composit.coat 1.2%, composit 1.0%
Focuses on coatings, especially composite coatings.

Cluster 75: (118) exist 13.5%, posit.solut 6.9%, solut 6.8%, boundari 5.3%, point 4.7%, theorem 4.6%, fix.point 4.1%, equat 3.7%, point.theorem 2.7%, fix.point.theorem 2.6%, posit 2.4%, fix 2.1%, differenti.equat 1.7%, differenti 1.5%, exist.multipl 1.2%, singular 1.1%, nonlinear 1.1%, exist.posit 1.0%, infin 1.0%
Focuses on the existence of positive solutions to equations, especially those involving a fixed point theorem.

Cluster 76: (108) popul 24.8%, genet 16.3%, divers 4.2%, polymorph 2.7%, genet.divers 2.6%, allel 1.9%, primer 1.8%, haplotyp 1.8%, ssr 1.8%, microsatellit 1.6%, speci 1.3%, china 1.2%, marker 1.1%, sequenc 1.0%, loci 1.0%
Focuses on genetic diversity in populations.

Cluster 77: (56) weld 36.0%, crack 7.4%, fatigu 3.6%, carbid 2.5%, joint 1.8%, fractur 1.7%, heat 1.4%, stress 1.3%
Focuses on the structure and properties of materials, with emphasis on characterization of welds and fatigue and fracture behavior.

Cluster 78: (75) late 6.7%, basin 5.8%, permian 3.7%, rock 3.1%, triassic 3.0%, earli 2.9%, jurass 2.8%, format 2.7%, cretac 2.3%, china 1.9%, middl 1.8%, sourc.rock 1.8%, south 1.6%, belt 1.6%, volcan 1.5%, sourc 1.3%, zone 1.3%, oil 1.3%, southern 1.1%, mesozo 1.1%
Focuses on geological formations in China, with emphasis on determination of geologic age.

Cluster 79: (82) vaccin 9.9%, antibodi 9.8%, immun 9.1%, antigen 5.7%, epitop 4.7%, viru 2.8%, assai 1.9%, mab 1.8%, mice 1.6%, elisa 1.5%, respons 1.5%, protein 1.4%, infect 1.3%, peptid 1.3%, dna.vaccin 1.2%, dna 1.1%, influenza 1.0%
Focuses on antibodies, vaccines, and immunity.

Cluster 80: (157) nanoparticl 64.5%, gold 2.4%, gold.nanoparticl 1.4%, size 1.4%
Focuses on nanoparticles, especially those containing gold.

Cluster 81: (168) decai 29.2%, bar 8.4%, psi 5.9%, branch 2.5%, branch.fraction 2.2%, gamma 2.2%, detector 2.0%, meson 1.4%, fraction 1.3%, measur 1.1%, violat 1.0%, x10 1.0%
Focuses on decays of subatomic particles, especially those involving branching fractions.

Cluster 82: (60) cool 8.7%, air 8.3%, heat 6.8%, rvr 5.8%, build 4.1%, energi.consumpt 3.8%, energi 3.6%, heat.cool 3.4%, ventil 3.3%, consumpt 2.6%, citi 2.0%, indoor 1.3%, energi.effici 1.2%
Focuses on air cooling and heating systems, especially their energy consumption and efficiency.

Cluster 83: (114) code 24.0%, channel 6.9%, scheme 4.3%, error 2.6%, symbol 2.5%, estim 1.9%, ofdm 1.8%, bit 1.8%, fade 1.6%, antenna 1.3%, cdma 1.2%, decod 1.1%, ber 1.1%, channel.estim 1.1%, multipl 1.0%
Focuses on coding over channels, with emphasis on errors and fading.

Cluster 84: (80) cross.section 14.1%, section 12.0%, cross 9.2%, scatter 3.8%, momentum 3.5%, isospin 2.7%, energi 2.7%, calcul 2.0%, differenti.cross 1.1%, differenti.cross.section 1.0%, neutron 1.0%
Focuses on cross sections, especially related to quantum reactions/interactions.

Cluster 85: (117) reaction 18.4%, transit.state 5.8%, energi 3.4%, b3lyp 2.7%, transit 2.0%, state 1.9%, 311 1.6%, mp2 1.5%, theori 1.3%, barrier 1.3%, calcul 1.2%, pathwai 1.2%, radic 1.2%, ch3 1.2%, product 1.1%, level 1.1%, energi.surfac 1.1%, potenti.energi 1.0%, potenti.energi.surfac 1.0%

Focuses on reactions, especially their energy and transition states.

Cluster 86: (107) qtl 13.4%, chromosom 11.4%, marker 5.2%, trait 5.1%, rice 3.8%, map 2.7%, genet 2.7%, hybrid 2.3%, genom 1.9%, seed 1.8%, parent 1.5%, line 1.3%, loci 1.2%, gene 1.1%, resist 1.1%, popul 1.0%
Focuses on chromosomes and genes, especially genetic markers and traits.

Cluster 87: (70) peer 14.8%, queri 9.3%, xml 8.3%, storag 5.1%, server 3.6%, file 3.1%, data 3.0%, system 1.6%, document 1.6%, peer.peer 1.6%, stream 1.6%, disk 1.5%, web 1.4%, servic 1.2%, node 1.1%, distribut 1.0%
Focuses on systems for storing and sharing data, especially peer to peer (P2P) systems.

Cluster 88: (100) deform 22.5%, strain 9.2%, strain.rate 5.4%, roll 5.0%, stress 2.1%, microstructur 2.0%, compress 1.8%, superplast 1.8%, tensil 1.6%, cold.roll 1.5%, alloi 1.4%, rate 1.3%, temperatur 1.2%, textur 1.1%, hot 1.1%, grain 1.1%, cold 1.0%, recrystal 1.0%, plastic 1.0%
Focuses on the deformation behavior of materials as determined through experimental investigations.

Cluster 89: (97) filter 47.0%, nois 18.4%, signal 2.6%
Focuses on filters, especially those designed to reduce noise.

Cluster 90: (76) star 30.9%, galaxi 10.3%, mass 2.9%, cluster 2.8%, stellar 2.6%, ngc 1.6%, outflow 1.5%, binari 1.3%, luminos 1.2%, circl.dot 1.1%
Focuses on stars, and their relation to composition and evolution of galaxies.

Cluster 91: (70) kinet 18.5%, reaction 8.4%, decomposit 2.5%, hydrolysi 2.3%, activ 2.2%, kinet.model 1.8%, rate 1.6%, kinet.paramet 1.6%, activ.energi 1.5%, enthalpi 1.2%, rate.constant 1.2%, mol 1.1%, paramet 1.1%, constant 1.0%
Focuses on kinetics of reactions.

Cluster 92: (193) gene 13.0%, cdna 7.4%, express 7.2%, sequenc 4.4%, protein 4.1%, amino.acid 3.6%, encod 3.2%, amino 3.1%, clone 2.6%, human 1.9%, acid 1.6%, testi 1.5%, transcript 1.3%, pcr 1.0%
Focuses on genes, especially cDNA.

Cluster 93: (53) chines 26.2%, famili 14.7%, mutat 8.8%, popul 4.2%, hear 2.4%, medicin 1.6%, genet 1.5%, diseas 1.3%, chines.medicin 1.2%, unrel 1.2%, gene 1.1%, chines.famili 1.0%
Focuses on Chinese families, with emphasis on genetics and medicine.

Cluster 94: (145) isol 10.6%, compound 9.5%, spectroscop 6.8%, elucid 5.6%, structur.elucid 5.3%, nmr 4.4%, new 4.0%, structur 2.2%, two.new 1.7%, elucid.basi 1.3%, basi 1.2%, elucid.spectroscop 1.2%, new.compound 1.2%, diterpenoid 1.2%, hydroxi 1.1%, name 1.1%, structur.elucid.spectroscop 1.1%, spectral 1.0%
Focuses on isolation of compounds and elucidation of their structures.

Cluster 95: (110) strain 20.6%, isol 6.5%, 16 5.9%, sequenc 4.2%, rrna 3.8%, phylogenet 3.1%, 16.rrna 3.0%, speci 2.7%, rrna.gene 2.5%, rdna 2.1%, 16.rrna.gene 2.1%, genu 2.0%, gene.sequenc 1.6%, rrna.gene.sequenc 1.6%, gene 1.4%, dna 1.2%, type.strain 1.0%
Focuses on isolates and strains of micro-organisms or genes, especially rRNA.

Cluster 96: (107) neuron 49.9%, receptor 2.2%, neuroprotect 1.4%, induc 1.3%, gaba 1.3%, activ 1.1%, rat 1.1%, glutam 1.0% *Focuses on neurons.*

Cluster 97: (84) chromatographi 11.5%, enzym 3.5%, purifi 3.1%, hsccc 2.8%, ethyl.acet 2.6%, acet 2.5%, purif 2.3%, ethyl 1.7%, crude 1.3%, puriti 1.3%, extract 1.2%, counter.current.chromatographi 1.2%, current.chromatographi 1.2%, counter.current 1.2%, gel 1.2%, prepar 1.1%, high.speed.counter 1.1%, speed.counter 1.1%, speed.counter.current 1.1%, solvent.system 1.0%, separ 1.0%
Focuses on compounds and enzymes, with emphasis on their synthesis, separation, and purification, and especially the use of chromatography.

Cluster 98: (144) equal 30.2%, let 13.1%, equal.equal 5.0%, element 4.3%, integ 3.7%, infin 3.4%, sigma 2.7%, subset 1.6%, mod 1.4%, prove 1.3%, delta 1.2%, posit.integ 1.0%, equal.equal.equal 1.0%
Focuses on mathematical investigations, with emphasis on solutions to equations and functions.

Cluster 99: (66) limit.cycl 11.6%, homoclin 7.8%, bifurc 5.4%, orbit 4.9%, cycl 4.1%, system 3.8%, limit 3.0%, oscil 2.4%, perturb 2.3%, period 2.2%, homoclin.orbit 1.9%, lyapunov.expon 1.5%, motion 1.4%, point 1.4%, chao 1.3%, lyapunov 1.2%, number.limit.cycl 1.2%, number.limit 1.2%, expon 1.0%, heteroclin 1.0%
Focuses on evaluations of systems, especially those involving limit cycles, homoclinic loops or orbits, and oscillation or oscillators.

Cluster 100: (170) tumor 37.3%, cell 13.1%, tumor.cell 2.8%, cell.line 2.1%, mice 1.9%, express 1.7%, line 1.3%, carcinoma 1.2%, cancer 1.0%
Focuses on tumors, including tumor growth, metastases, treatment, and inhibition, with emphasis on experiments involving cells in mice or cell lines.

Cluster 101: (147) beam 60.2%, gaussian 3.0%, gaussian.beam 1.7%, propag 1.3%
Focuses on beams, especially Gaussian beams.

Cluster 102: (108) traffic 20.8%, network 8.2%, rout 7.1%, qo 4.3%, packet 3.9%, bandwidth 2.7%, scheme 2.4%, multicast 2.1%, delai 1.6%, internet 1.6%, congest 1.5%, protocol 1.5%, node 1.4%, hoc 1.1%, wireless 1.0%
Focuses on traffic, mainly on internet and electronic traffic.

Cluster 103: (127) grain 46.9%, grain.size 4.7%, boundari 4.1%, grain.boundari 3.5%, size 2.2%, microstructur 1.5%, alloi 1.5%, deform 1.3%, refin 1.1%, grain.refin 0.7%,

twin 0.7%, ribbon 0.7%, grain.growth 0.6%, recrystal 0.6%, phase 0.6%, temperatur 0.5%, ecap 0.4%, surfac 0.4%, anneal 0.4%, cast 0.3%, growth 0.3%, textur 0.3%, averag.grain 0.3%, plastic 0.3%, dendrit 0.3%
Focuses on the grain structure of various alloys and the microstructure of such alloys.

Cluster 104: (351) film 31.3%, thin.film 22.0%, thin 19.1%, substrat 1.8%, deposit 1.5%, temperatur 0.7%, anneal 0.5%, sputter 0.5%, zno 0.4%, tio2 0.3%, optic 0.3%, electron 0.3%, orient 0.3%, layer 0.2%, film.deposit 0.2%, grown 0.2%, silicon 0.2%, structur 0.2%, sol 0.2%, surfac 0.2%, crystal 0.2%, resist 0.2%, magnetron 0.2%, magnetron.sputter 0.2%, dope 0.2%
Focuses on thin films and their deposition.

Cluster 105: (126) aryl 21.6%, catalyz 8.0%, reaction 5.5%, palladium 5.0%, alkyn 3.8%, coupl 3.6%, palladium.catalyz 3.6%, coupl.reaction 3.4%, yield 3.2%, cross.coupl 2.1%, stereoselect 2.0%, afford 1.3%, regioselect 1.1%, suzuki 1.1%, synthesi 0.9%, substitut 0.9%, aryl.halid 0.8%, termin.alkyn 0.7%, halid 0.7%, phosphin 0.7%, cross 0.7%, cross.coupl.reaction 0.7%, sonogashira 0.5%, termin 0.4%, iodid 0.4%
Focuses on chemical reactions with an emphasis on catalyzing agents.

Cluster 106: (77) waveguid 26.8%, fdtd 7.0%, differ.time.domain 2.3%, finit.differ 2.3%, time.domain 2.3%, differ.time 2.3%, finit.differ.time 2.1%, index 1.6%, optic 1.5%, finit 1.3%, domain 1.3%, differ 1.2%, domain.fdtd 1.0%, time.domain.fdtd 1.0%, coupl 1.0%, mode 0.9%, mmi 0.8%, multimod 0.8%, photon 0.7%, simul 0.7%, band 0.6%, propag 0.6%, caviti 0.6%, electromagnet 0.6%, numer 0.6%
Focuses on waveguides along with Finite Difference Time Domain analysis of the waveguides.

Cluster 107: (131) column 9.1%, mobil.phase 7.0%, separ 5.8%, phase 4.5%, mobil 4.1%, chromatograph 2.6%, acid 2.0%, hplc 1.9%, stationari.phase 1.9%, detect 1.9%, high.liquid 1.8%, liquid 1.7%, chromatographi 1.6%, methanol 1.5%, min 1.4%, chiral 1.4%, stationari 1.3%, csp 1.3%, revers.phase 1.1%, liquid.chromatographi 1.0%, acetonitril 0.9%, high.liquid.chromatographi 0.8%, flow.rate 0.7%, mug 0.7%, recoveri 0.7%
Focuses on different means of either charge or mass separation, high pressure liquid chromatography, or liquid-liquid extraction

Cluster 108: (97) equat 21.0%, differenti.equat 15.5%, differenti 11.8%, partial.differenti 3.7%, partial.differenti.equat 3.0%, stochast 2.5%, partial 2.0%, solut 1.3%, nonlinear 1.2%, numer 1.0%, viscoelast 0.9%, ordinari.differenti 0.9%, ordinari.differenti.equat 0.9%, ordinari 0.7%, stochast.differenti 0.6%, linear 0.6%, dynam 0.5%, gener 0.4%, govern 0.4%, stochast.differenti.equat 0.4%, system 0.4%, function 0.4%, deriv 0.3%, plate 0.3%, non 0.3%
Focuses on differential equations to describe various systems

Cluster 109: (120) chiral 21.4%, enantioselect 11.8%, asymmetr 9.5%, allyl 3.9%, ligand 3.5%, keton 3.2%, reaction 2.4%, aldehyd 2.1%, yield 1.5%, synthesi 1.4%, alcohol 1.3%, catalyz 1.2%, catalyt 1.1%, addit 0.7%, catalyz.asymmetr 0.5%, asymmetr.addit 0.5%, aromat 0.5%, deriv 0.5%, beta 0.4%, oxazolin 0.4%, catalyt.asymmetr 0.4%, new.chiral 0.3%, catalyst 0.3%, absolut.configur 0.3%, unsatur 0.3%
Focuses on chiral compounds, chiral ligands and enantioselectivity.

Cluster 110: (204) cell 32.9%, apoptosi 13.7%, induc 3.6%, bcl 2.0%, caspas 2.0%, inhibit 1.4%, apoptot 1.4%, express 1.3%, activ 1.2%, prolifer 1.1%, induc.apoptosi 1.0%, cell.cycl 0.9%, death 0.8%, protein 0.7%, cell.death 0.7%, cell.apoptosi 0.6%, k562 0.6%, dna 0.5%, arrest 0.5%, cell.line 0.5%, cycl 0.5%, bax 0.5%, inhibitor 0.4%, ro 0.4%, regul 0.4%
Focuses on multiple types of cells and what affects them, emphasizing apoptosis.

Cluster 111: (80) nanorod 37.0%, nanobelt 8.5%, nanostructur 3.0%, synthes 1.7%, growth 1.6%, length 1.6%, singl.crystallin 1.3%, hydrotherm 1.2%, singl 1.1%, crystallin 1.1%, diamet 1.0%, crystal 0.9%, templat 0.7%, format 0.7%, mum 0.7%, surfact 0.5%, nanorod.synthes 0.5%, step 0.5%, singl.crystal 0.5%, mechan 0.5%, growth.mechan 0.5%, morpholog 0.4%, oxid.nanorod 0.4%, xrd 0.3%, structur 0.3%
Focuses on nanostructures, especially nanorods and nanobelts, and their formation and characteristics

Cluster 112: (135) steel 38.7%, ferrit 6.3%, austenit 5.1%, grain 2.0%, roll 1.8%, martensit 1.7%, microstructur 1.2%, transform 1.0%, strength 1.0%, deform 0.9%, carbon 0.9%, precipit 0.8%, bainit 0.8%, temperatur 0.7%, low.carbon 0.6%, stainless.steel 0.6%, stainless 0.6%, hard 0.6%, disloc 0.5%, carbon.steel 0.5%, cool 0.4%, boundari 0.4%, low 0.4%, tough 0.4%, size 0.4%
Focuses on various steels, especially ferritic and austenitic, with an emphasis on failure modes, testing, and composition

Cluster 113: (98) beta 43.3%, cyclodextrin 9.8%, alpha 2.8%, beta.cyclodextrin 2.8%, inclus 2.3%, complex 1.4%, inclus.complex 1.4%, benzoyl 1.0%, acid 1.0%, nmr 0.8%, glcp 0.8%, beta.beta 0.7%, bind 0.7%, acetyl 0.6%, alpha.beta 0.5%, trichloroacetimid 0.5%, cyclodextrin.beta 0.4%, guest 0.4%, residu 0.4%, beta.glcp 0.4%, beta.cyclodextrin.beta 0.4%, benzoyl.beta 0.4%, caviti 0.3%, cd 0.3%, bi.beta 0.3%
Focuses on alpha and beta cyclodextrin.

Cluster 114: (338) catalyst 53.8%, catalyt 2.8%, activ 2.5%, oxid 2.2%, select 1.5%, al2o3 1.4%, hydrogen 1.3%, support 1.2%, reaction 1.1%, methan 1.0%, convers 1.0%, methanol 0.7%, sio2 0.6%, al2o3.catalyst 0.5%, gamma.al2o3 0.5%, reduct 0.5%, oxygen 0.5%, promot 0.5%, surfac 0.5%, impregn 0.4%, carbon 0.4%, catalyt.activ 0.4%, temperatur 0.4%, zro2 0.4%, speci 0.4%
Focuses on chemical reactions, specifically those involving catalysts.

Cluster 115: (106) heat 36.8%, heat.transfer 8.9%, transfer 6.0%, fin 1.9%, heat.flux 1.7%, flux 1.6%, cycl 1.4%, convect 1.2%, refriger 1.1%, temperatur 0.9%, model 0.9%, exergi 0.8%, cool 0.8%, flow 0.7%, mass.transfer 0.7%, heat.exchang 0.6%, compressor 0.5%, heat.pump 0.4%, irrevers 0.4%, coeffici 0.4%, experiment 0.4%, transfer.coeffici 0.4%, tube 0.3%, mass 0.3%, power 0.3%
Focuses on heat transfer.

Cluster 116: (80) search 37.1%, algorithm 11.4%, tree 2.1%, search.algorithm 2.1%, heurist 2.0%, constraint 1.9%, queri 1.3%, tabu 1.0%, optim 1.0%, local.search 0.9%, distanc 0.8%, mine 0.8%, set 0.7%, genet 0.7%, graph 0.7%, comput 0.7%, genet.algorithm 0.6%, tabu.search 0.6%, model 0.4%, local 0.4%, search.space 0.4%, benchmark 0.4%, line.search 0.4%, pattern 0.3%, train 0.3%
Focuses on algorithems, especially search algorithms, development for specific problems of interest.

Cluster 117: (112) polymer 32.5%, graft 6.0%, monom 5.1%, initi 2.6%, polym 2.1%, acryl 1.6%, molecular.weight 1.3%, raft 1.2%, methacryl 1.2%, radic.polymer 1.1%, radic 1.1%, mma 1.0%, weight 1.0%, atrp 0.9%, copolymer 0.9%, methyl 0.8%, poli 0.8%, styren 0.7%, copolym 0.7%, molecular 0.6%, vinyl 0.6%, convers 0.6%, transfer 0.6%, atom.transfer 0.5%, transfer.radic.polymer 0.5%
Focuses on various polymers, copolymers, monomers, and grafting.

Cluster 118: (77) machin 36.7%, svm 4.8%, tool 2.8%, support.vector 2.7%, cut 2.5%, support.vector.machin 2.2%, vector.machin 2.2%, grind 1.8%, vector 1.3%, error 1.1%, pl 1.0%, kernel 0.9%, machin.tool 0.9%, support 0.8%, speed 0.8%, model 0.7%, classif 0.6%, optim 0.6%, case 0.5%, manufactur 0.5%, micro 0.4%, learn 0.4%, descriptor 0.4%, surfac 0.4%, machin.svm 0.4%
Focuses on support vector machines.

Cluster 119: (86) neutron 13.1%, proton 8.9%, nuclei 8.7%, band 3.4%, nucleon 2.5%, energi 2.1%, gamma 1.8%, relativist 1.6%, mev 1.4%, state 1.3%, nuclear 1.1%, detector 1.1%, calcul 1.1%, mean.field 1.1%, nucleu 1.0%, triaxial 1.0%, relativist.mean.field 1.0%, relativist.mean 1.0%, rmf 0.9%, odd 0.8%, deform 0.8%, superdeform 0.6%, model 0.6%, nuclear.matter 0.6%, moment.inertia 0.6%
Focuses on various experiments that probe the nucleus, emphasizing detection of protons and neutrons.

Cluster 120: (78) matric 26.1%, matrix 13.6%, rank 3.4%, invers 3.3%, eigenvalu 3.2%, singular 3.1%, condit 1.4%, element 1.4%, condit.number 1.3%, nonsingular 1.2%, suffici.condit 1.1%, suffici 1.0%, bound 0.9%, multilinear 0.9%, oper 0.9%, commut 0.8%, represent 0.8%, number 0.7%, vandermond 0.7%, kernel 0.6%, displac.structur 0.5%, drazin 0.5%, space 0.5%, singular.integr 0.5%, integr 0.5%
Focuses on mathematics, with a strong emphasis on matrices.

Cluster 121: (129) fiber 25.6%, wavelength 11.0%, optic 6.2%, gain 2.7%, pump 2.4%, laser 1.6%, puls 1.5%, power 1.5%, amplifi 1.4%, birefring 1.4%, dispers 1.1%, fibr

1.0%, polar 0.9%, erbium 0.9%, tunabl 0.8%, output 0.8%, pcf 0.7%, signal 0.7%, erbium.dope 0.6%, modul 0.6%, mode 0.6%, raman 0.6%, optic.fiber 0.5%, dope 0.5%, dope.fiber 0.4%
Focuses on fiber optics and the component fibers.

Cluster 122: (181) adsorpt 60.1%, adsorb 6.2%, adsorpt.capac 1.8%, surfac 1.5%, capac 1.2%, resin 1.1%, isotherm 1.0%, acid 0.5%, remov 0.5%, ion 0.5%, adsorpt.isotherm 0.4%, water 0.4%, langmuir 0.4%, carbon 0.4%, exchang 0.4%, solut 0.3%, activ.carbon 0.3%, zeolit 0.3%, metal 0.3%, soil 0.3%, concentr 0.3%, activ 0.2%, chitosan 0.2%, group 0.2%, mol 0.2%
Focuses on adsorption and removal of matter from various media using various adsorption media.

Cluster 123: (102) mass 8.9%, spectrometri 7.8%, mass.spectrometri 7.3%, chromatographi 4.3%, ioniz 4.2%, ion 3.0%, esi 2.9%, electrosprai 2.5%, liquid.chromatographi 2.4%, liquid 2.3%, electrosprai.ioniz 1.5%, fragment 1.2%, tandem.mass 1.1%, tandem 1.0%, hplc 0.9%, high.liquid 0.9%, extract 0.8%, high.liquid.chromatographi 0.8%, separ 0.8%, chromatographi.mass 0.7%, chromatographi.mass.spectrometri 0.7%, ga.chromatographi 0.7%, ga 0.7%, tandem.mass.spectrometri 0.6%, ioniz.mass 0.6%
Focuses on mass spectrometry and liquid chromatography.

Cluster 124: (88) jet 10.6%, grb 5.6%, radio 4.5%, pulsar 4.3%, gamma.rai 3.6%, burst 2.9%, sourc 2.4%, rai 2.4%, emiss 2.2%, disk 2.0%, gamma 2.0%, line 1.6%, accret 1.6%, flare 1.5%, agn 1.5%, afterglow 1.3%, luminos 1.3%, compon 1.2%, gamma.rai.burst 1.1%, rai.burst 1.0%, galact 0.9%, similar 0.9%, model 0.8%, accret.disk 0.7%, light.curv 0.6%
Focuses on many different aspects of astronomy, including pulsars, gamma ray emission and luminosity.

Cluster 125: (71) switch 20.0%, power 19.4%, voltag 5.4%, convert 4.0%, output 2.0%, diod 1.4%, oper 1.3%, devic 1.3%, current 1.2%, circuit 1.0%, optic 0.9%, power.factor 0.9%, optic.switch 0.9%, modul 0.8%, zv 0.7%, oper.principl 0.6%, mode 0.6%, rectifi 0.5%, control 0.4%, design 0.4%, power.consumpt 0.4%, input 0.3%, system 0.3%, oscil 0.3%, high 0.3%
Focuses on power, namely electrical power, as well as various switches and power converters.

Cluster 126: (188) sinter 44.3%, powder 3.2%, sinter.temperatur 2.7%, grain 2.0%, ceram 2.0%, temperatur 1.7%, composit 1.4%, sp 1.3%, sampl 1.3%, plasma.sinter 1.1%, spark 1.0%, spark.plasma 0.9%, spark.plasma.sinter 0.9%, microstructur 0.8%, press 0.8%, properti 0.7%, phase 0.7%, sinter.sp 0.6%, densiti 0.6%, materi 0.6%, thermoelectr 0.5%, sic 0.4%, plasma.sinter.sp 0.4%, fabric 0.4%, size 0.4%
Focuses on various sintering techniques such as spark plasma sintering, and the mechanical properties of sintered materials as well as proper sintering techniques.

Cluster 127: (152) puls 49.1%, laser 10.8%, laser.puls 3.7%, optic 1.4%, femtosecond 1.1%, gener 0.7%, plasma 0.6%, pump 0.5%, chirp 0.5%, phase 0.4%, durat 0.4%, power 0.4%, modul 0.3%, radiat 0.3%, frequenc 0.3%, nonlinear 0.3%, puls.durat 0.3%, intens 0.3%, ultrashort 0.3%, signal 0.3%, time 0.3%, harmon 0.3%, group.veloc 0.3%, field 0.3%, numer 0.3%
Focuses on pulses from optical lasers.

Cluster 128: (149) extract 51.8%, spme 3.0%, acid 1.9%, solvent 1.9%, sampl 1.2%, solid.phase 1.1%, liquid 1.1%, phase 1.0%, phase.microextract 0.9%, microextract 0.9%, solid 0.8%, chromatographi 0.7%, hplc 0.6%, extract.effici 0.5%, solid.phase.microextract 0.5%, ga.chromatographi 0.4%, water 0.4%, detect 0.4%, extract.time 0.4%, organ 0.4%, headspac 0.3%, sfe 0.3%, compound 0.3%, ga 0.3%, volatil 0.3%
Focuses on the extraction and recovery of one physical component from another physical component.

Cluster 129: (151) network 60.6%, node 5.6%, connect 1.3%, topolog 0.9%, model 0.7%, sensor 0.7%, scale.free 0.6%, sensor.network 0.5%, dynam 0.4%, simul 0.4%, scale 0.4%, algorithm 0.4%, distribut 0.3%, system 0.3%, small.world 0.3%, world 0.3%, link 0.3%, rout 0.3%, architectur 0.3%, complex.network 0.3%, processor 0.2%, scale.free.network 0.2%, free.network 0.2%, data 0.2%, commun 0.2%
Focuses on networks, specifically computer networks, and the various nodes in a network.

Cluster 130: (173) laser 30.6%, pump 15.4%, power 5.1%, output 3.0%, optic 1.7%, diod 1.6%, output.power 1.6%, caviti 1.3%, lock 1.1%, puls 1.0%, pump.power 0.8%, yag 0.8%, mode 0.8%, switch 0.8%, mode.lock 0.6%, laser.diod 0.6%, modul 0.4%, effici 0.4%, repetit 0.4%, frequenc 0.4%, intens 0.4%, signal 0.4%, satur 0.3%, beam 0.3%, rate 0.3%
Focuses on lasers and pumped lasers.

Cluster 131: (228) magnet 58.2%, magnet.field 5.8%, field 5.1%, magnet.properti 1.7%, temperatur 1.5%, coerciv 0.7%, anisotropi 0.7%, phase 0.7%, properti 0.6%, grain 0.4%, sampl 0.3%, ribbon 0.3%, ferrit 0.3%, structur 0.3%, coupl 0.3%, magnet.measur 0.2%, particl 0.2%, materi 0.2%, ferromagnet 0.2%, measur 0.2%, transit 0.2%, electr 0.2%, exchang.coupl 0.2%, magnetostrict 0.2%, compound 0.2%
Focuses on magnetic properties of various materials, the effects of magnetization on various materials.

Cluster 132: (231) electron.microscopi 7.9%, microscopi 6.9%, transmiss.electron 6.4%, transmiss.electron.microscopi 6.3%, electron 6.2%, transmiss 5.0%, diffract 3.2%, rai 3.2%, electron.microscopi.tem 2.8%, microscopi.tem 2.8%, tem 2.8%, diffract.xrd 1.6%, xrd 1.3%, rai.diffract 1.3%, powder 1.1%, rai.diffract.xrd 1.0%, synthes 0.8%, xrd.transmiss.electron 0.8%, diffract.xrd.transmiss 0.7%, xrd.transmiss 0.7%, nanorod 0.7%, rai.powder 0.7%, rai.powder.diffract 0.6%, powder.diffract 0.6%, morpholog 0.6%

Focuses on electron microscopy, especially transmission electron microscopy: (tem).

Cluster 133: (166) cancer 20.2%, cell 12.6%, express 5.7%, cancer.cell 4.6%, breast 3.0%, gastric 2.9%, p53 2.8%, tissu 2.4%, mmp 2.0%, breast.cancer 1.6%, carcinoma 1.5%, cell.line 1.5%, tumor 1.5%, apoptosi 1.1%, line 1.0%, protein 1.0%, gastric.cancer 0.8%, human 0.7%, gene 0.7%, mrna 0.7%, invas 0.5%, activ 0.5%, cancer.cell.line 0.5%, normal 0.4%, mcf 0.4%
Focuses on various forms of cancer and possible treatments, and cellular expression.

Cluster 134: (109) atom 43.7%, oxygen.atom 3.6%, nitrogen.atom 2.5%, oxygen 1.8%, ligand 1.5%, nitrogen 1.4%, complex 1.2%, coordin 1.2%, two 1.2%, distort 1.0%, structur 0.9%, ion 0.8%, bridg 0.7%, two.oxygen 0.7%, two.oxygen.atom 0.7%, atom.two 0.7%, tin 0.6%, tin.atom 0.6%, geometri 0.6%, crystal 0.5%, site 0.5%, on 0.5%, molecul 0.4%, atom.on 0.3%, bipyramid 0.3%
Focuses on atomic structure concentrating on O2 and N2 atoms, with emphasis on ligands and synthesis of complexes.

Cluster 135: (84) decis 36.1%, suppli.chain 3.8%, custom 3.6%, inform 3.2%, suppli 2.3%, linguist 1.7%, risk 1.3%, system 1.3%, product 1.3%, oper 1.2%, model 1.2%, decis.support 1.2%, decis.support.system 1.0%, support.system 1.0%, chain 0.9%, select 0.9%, decis.maker 0.8%, decis.model 0.7%, attribut 0.7%, support 0.7%, maker 0.7%, integr 0.6%, cost 0.6%, onlin 0.6%, new.product 0.6%
Focuses on business structure and business modeling and supply chains, including the role of linguistics in the decision support systems.

Cluster 136: (116) crystal 8.4%, singl.crystal 7.7%, rai 6.0%, singl.crystal.rai 6.0%, crystal.rai 5.8%, diffract 5.2%, crystal.rai.diffract 3.9%, singl 3.0%, structur 2.9%, compound 2.8%, rai.diffract 2.5%, synthes 2.1%, hydrotherm 1.4%, crystal.structur 1.1%, h2o 1.0%, angstrom 0.9%, hpo3 0.8%, complex 0.8%, bpy 0.7%, element 0.7%, nmr 0.6%, structur.singl.crystal 0.6%, structur.singl 0.5%, new 0.5%, framework 0.5%
Focuses on single crystal x-ray diffraction method for analyzing compounds and their structure.

Cluster 137: (124) blend 39.9%, hdpe 4.2%, mechan.properti 1.6%, melt 1.6%, crystal 1.1%, starch 1.1%, lldpe 1.1%, graft 1.1%, properti 1.0%, polyethylen 0.9%, mechan 0.8%, peo 0.7%, phase 0.7%, tensil 0.7%, shear 0.7%, temperatur 0.6%, strength 0.6%, morpholog 0.6%, densiti.polyethylen 0.6%, content 0.6%, epdm 0.6%, ldpe 0.6%, vibrat 0.5%, nylon 0.5%, copolym 0.5%
Focuses on blends, especially of polymers, with emphasis on high density polyethylene as well as mechanical and melt properties.

Cluster 138: (109) kong 13.4%, hong 13.3%, hong.kong 12.7%, health 5.4%, sar 4.4%, care 2.4%, chines 1.1%, women 1.0%, practic 1.0%, risk 0.7%, psycholog 0.5%, ag 0.5%, medic 0.5%, social 0.5%, perceiv 0.5%, health.care 0.5%, influenza 0.4%, nurs

0.4%, respond 0.4%, popul 0.4%, singapor 0.4%, worker 0.4%, hospit 0.4%, diseas 0.4%, peopl 0.4%
Focuses on health problems among Chineese citizens, especially in Hong Kong.

Cluster 139: (112) surfact 30.5%, micel 7.1%, vesicl 3.2%, sd 2.9%, sodium 2.4%, ctab 2.0%, concentr 2.0%, cmc 1.5%, anion 1.2%, water 1.0%, oil 0.9%, anion.surfact 0.9%, mix 0.9%, interact 0.9%, triton 0.8%, triton.100 0.8%, aggreg 0.8%, cation 0.7%, tension 0.7%, biodegrad 0.7%, hydrophob 0.6%, micellar 0.6%, solubil 0.6%, microemuls 0.5%, solut 0.5%
Focuses on surfactants and micelles and their aggregates.

Cluster 140: (180) ceram 50.0%, zro2 2.4%, sinter 2.3%, glass.ceram 1.6%, composit 1.3%, strength 1.3%, glass 1.3%, fractur 1.2%, al2o3 1.0%, materi 0.8%, mechan.properti 0.8%, green 0.7%, microstructur 0.7%, gelcast 0.7%, properti 0.7%, green.bodi 0.7%, tough 0.6%, slurri 0.6%, temperatur 0.5%, fractur.tough 0.5%, mechan 0.5%, powder 0.5%, grind 0.4%, si3n4 0.4%, grain 0.4%
Focuses on ceramics, including fabrication, doping, and mechanical properties.

Cluster 141: (100) preval 12.0%, hiv 9.2%, smoke 5.0%, sexual 4.3%, risk 3.1%, china 2.2%, infect 1.8%, health 1.5%, smoker 1.4%, femal 1.4%, drug 1.3%, ag 1.3%, women 1.2%, rural 1.2%, chines 1.2%, male 1.2%, year 1.0%, survei 0.9%, sex 0.9%, hiv.aid 0.9%, aid 0.9%, diseas 0.9%, worker 0.9%, men 0.8%, popul 0.8%
Focuses on sexually transmitted diseases such as HIV. Also focuses on smoking and its health problems, as well as other respiratory ailments.

Cluster 142: (121) sediment 26.5%, lake 10.7%, river 6.6%, water 4.4%, estuari 3.2%, coastal 1.9%, concentr 1.2%, china 0.8%, sea 0.8%, bai 0.8%, season 0.7%, pcb 0.7%, pah 0.6%, pearl.river 0.6%, pearl 0.6%, area 0.6%, river.estuari 0.6%, nutrient 0.6%, tidal 0.5%, level 0.5%, fish 0.4%, phosphoru 0.4%, tide 0.4%, pearl.river.estuari 0.4%, reef 0.4%
Focuses on sediments and sediment tracking and contamination in various water sources; lakes, rivers, estuaries, seas, etc.

Cluster 143: (114) sequenc 28.3%, genom 9.3%, dna 6.8%, chromosom 3.1%, dna.sequenc 2.7%, clone 2.6%, gene 2.1%, nucleotid 2.1%, isol 1.5%, viru 1.4%, rna 1.0%, strain 0.8%, fragment 0.8%, region 0.6%, code 0.5%, amino.acid 0.5%, pcr 0.5%, rice 0.5%, ident 0.5%, amino 0.5%, hybrid 0.4%, protein 0.4%, mrna 0.4%, replic 0.3%, segment 0.3%
Focuses on dna and genomic sequencing.

Cluster 144: (138) electrod 39.1%, electrochem 3.3%, carbon 2.9%, oxid 2.0%, current 1.3%, biosensor 1.1%, glucos 1.0%, carbon.electrod 0.9%, potenti 0.9%, peak 0.8%, surfac 0.8%, platinum 0.8%, mwnt 0.8%, detect 0.8%, voltammetri 0.6%, cnt 0.6%, gce 0.6%, cyclic 0.6%, mol 0.6%, amperometr 0.6%, glassi.carbon 0.5%, peak.current 0.5%, electrocatalyt 0.5%, glassi.carbon.electrod 0.5%, detect.limit 0.5%
Focuses on electrodes in electrochemical systems, especially carbon-based electrodes.

Cluster 145: (142) algorithm 29.8%, converg 10.3%, iter 4.3%, optim 2.6%, program 2.3%, solv 1.8%, global 1.6%, newton 1.5%, constraint 1.5%, linear 1.2%, numer 1.1%, trust.region 1.0%, linear.program 0.9%, function 0.9%, new 0.8%, algorithm.solv 0.8%, trust 0.7%, comput 0.7%, smooth 0.7%, global.converg 0.6%, point 0.6%, object.function 0.6%, solut 0.5%, quadrat 0.5%, genet.algorithm 0.5%
Focuses on algorithm development, especially modeling, convergence, and optimization.

Cluster 146: (82) photon 10.3%, atom 7.7%, field 6.6%, three.level 2.8%, coher 2.7%, level 2.6%, state 2.6%, caviti 2.4%, excit 2.1%, quantum 1.8%, level.atom 1.7%, two.photon 1.4%, detun 1.2%, two 1.1%, reson 0.9%, probe 0.9%, popul 0.9%, three.level.atom 0.8%, electromagnet.induc.transpar 0.8%, electromagnet.induc 0.8%, induc.transpar 0.7%, magnon 0.7%, mode 0.7%, absorpt 0.7%, caviti.field 0.6%
Focuses on photons: (emission/absorption/interaction) and multi-level atomic systems emphasizing the role of fields on the photon and atomic system behaviors.

Cluster 147: (102) turbul 29.6%, flow 7.0%, vortex 3.9%, vortic 3.2%, veloc 2.3%, reynold 1.8%, fire 1.6%, model 1.6%, pressur 1.5%, bubbl 1.3%, particl 1.2%, simul 1.1%, number 0.9%, reynold.number 0.7%, wall 0.7%, combust 0.7%, flame 0.6%, eddi 0.6%, turbul.flow 0.6%, scale 0.6%, vent 0.5%, street 0.5%, turbul.model 0.5%, numer 0.5%, fluctuat 0.4%
Focuses on turbulent flow, especially vortex dynamics and modeling.

Cluster 148: (99) theorem 49.9%, semigroup 2.9%, prove 2.7%, regular 2.3%, subgroup 2.0%, space 1.3%, finit 1.0%, finit.group 0.9%, convex 0.7%, congruenc 0.7%, condit 0.7%, group 0.6%, proof 0.6%, class 0.5%, set 0.5%, point 0.5%, oper 0.5%, order 0.5%, fan 0.4%, topolog 0.4%, prime 0.4%, theori 0.4%, limit.theorem 0.4%, maxim 0.4%, isomorph 0.4%
Focuses on mathematical theorems.

Cluster 149: (142) discharg 11.1%, capac 6.9%, cathod 6.7%, electrochem 6.4%, cycl 3.5%, electrolyt 3.5%, lithium 3.2%, batteri 2.6%, materi 2.4%, charg.discharg 2.2%, mah 2.0%, lifepo4 2.0%, charg 1.7%, composit 1.3%, oxid 1.2%, discharg.capac 1.1%, licoo2 1.1%, cathod.materi 1.0%, electrod 1.0%, lithium.ion 0.9%, polym.electrolyt 0.8%, ion 0.7%, spinel 0.5%, conduct 0.5%, powder 0.5%
Focuses on the charge and discharge capacity of various materials, and mainly their use in electrochemical/electrical charge transfers. Basically it focuses on batteries/battery cells.

Cluster 150: (126) fluoresc 41.5%, bind 4.0%, quench 2.9%, fluoresc.intens 2.4%, bsa 1.6%, hsa 1.5%, intens 1.3%, fluoresc.quench 0.9%, complex 0.9%, ion 0.8%, mol 0.7%, bind.constant 0.6%, emiss 0.6%, albumin 0.6%, dna 0.6%, spectra 0.6%, serum.albumin 0.5%, constant 0.5%, serum 0.5%, fluoresc.spectra 0.4%, concentr 0.4%, protein 0.4%, interact 0.4%, detect 0.4%, sensit 0.4%
Focuses on the fluorescence of various materials/atoms/compounds and fluorescence quenching.

Cluster 151: (144) piezoelectr 9.7%, ceram 8.7%, ferroelectr 6.7%, dope 6.0%, dielectr 4.1%, pzt 3.7%, phase 2.2%, properti 1.7%, electr 1.5%, composit 1.3%, piezoelectr.properti 1.3%, relaxor 1.0%, crystal 0.9%, oxygen.vacanc 0.8%, tetragon 0.8%, temperatur 0.8%, pmn 0.8%, perovskit 0.8%, vacanc 0.8%, grain 0.7%, bi4ti3o12 0.6%, sampl 0.6%, constant 0.6%, polar 0.6%, 3nb2 0.5%
Focuses on the piezoelectric and dielectric properties of various materials, including ceramics.

Cluster 152: (128) film 35.5%, electrod 5.3%, multilay.film 3.1%, multilay 2.8%, tio2 2.1%, electrochem 1.5%, layer 1.3%, tio2.film 1.1%, biosensor 1.1%, assembl 0.9%, glucos 0.8%, layer.layer 0.7%, cyclic 0.7%, voltammetri 0.7%, film.electrod 0.5%, carbon 0.5%, deposit 0.5%, self.assembl 0.5%, cyclic.voltammetri 0.5%, surfac 0.5%, redox 0.4%, solut 0.4%, carbon.electrod 0.4%, mol 0.4%, oxid 0.4%
Focuses on films and doping agents that are embedded or placed on films, such as sensors.

Cluster 153: (99) children 15.2%, chines 10.5%, social 8.0%, school 7.4%, cultur 4.0%, adolesc 2.6%, moral 1.7%, parent 1.2%, teacher 1.1%, kong 1.0%, hong 1.0%, hong.kong 1.0%, child 0.8%, self 0.7%, ag 0.7%, depress 0.7%, belief 0.7%, peer 0.7%, compet 0.6%, dental 0.6%, score 0.6%, perceiv 0.5%, person 0.5%, year 0.5%, support 0.4%
Focuses on various social and health characteristics and behaviours of Chinese citizens and children.

Cluster 154: (132) dna 33.9%, mutat 9.8%, pcr 4.5%, gene 3.7%, detect 3.2%, primer 1.7%, sequenc 1.4%, methyl 1.2%, mutant 0.9%, genom 0.8%, probe 0.6%, microarrai 0.6%, oligonucleotid 0.6%, polymeras 0.6%, hybrid 0.5%, hbv 0.5%, cell 0.4%, plasmid 0.4%, promot 0.4%, sampl 0.4%, assai 0.4%, tumor 0.4%, sensit 0.4%, point.mutat 0.4%, cancer 0.4%
Focuses on dna, specifically on detection, characterization, mutation, sequencing.

Cluster 155: (88) mice 49.8%, induc 1.7%, dose 1.6%, express 1.5%, level 1.2%, group 0.7%, treat 0.7%, increas 0.6%, activ 0.5%, protect 0.5%, inhibit 0.5%, administr 0.5%, liver 0.5%, control 0.4%, receptor 0.4%, brain 0.4%, mrna 0.4%, tissu 0.3%, anim 0.3%, morphin 0.3%, decreas 0.3%, histamin 0.3%, infect 0.3%, acid 0.3%, mous 0.2%
Focuses on the use of mice in medical experiments.

Cluster 156: (113) seismic 14.3%, fault 5.4%, earthquak 5.0%, basin 4.5%, veloc 4.0%, crust 3.0%, mantl 2.3%, river 2.0%, wave 2.0%, reservoir 1.7%, crustal 1.6%, moho 1.5%, zone 1.4%, area 1.3%, tecton 1.3%, geolog 1.1%, belt 0.9%, wave.veloc 0.8%, depth 0.7%, region 0.7%, seismic.wave 0.6%, rock 0.6%, upper 0.6%, beneath 0.6%, uplift 0.5%
Focuses on seismic activity, including earthquakes.

Cluster 157: (138) chemiluminesc 5.2%, detect.limit 4.7%, mug 3.7%, sampl 3.6%, detect 3.1%, rel.standard 3.0%, limit 2.9%, rel.standard.deviat 2.8%, standard 2.7%, standard.deviat 2.5%, deviat 2.0%, trace 1.9%, inject 1.7%, flow.inject 1.6%, rsd 1.6%, formaldehyd 1.5%, flow 1.4%, recoveri 1.3%, linear.rang 1.3%, preconcentr 1.3%, rel 1.2%, selenium 1.1%, rang 1.1%, reaction 0.8%, digest 0.7%
Focuses on chemiluminescence, emphasizing issues of detection limit for detecting trace material amounts, especially at the microgram level of concentration.

Cluster 158: (445) film 64.8%, deposit 2.6%, substrat 1.4%, thick 1.0%, anneal 0.7%, surfac 0.5%, film.thick 0.5%, zno 0.5%, film.deposit 0.5%, temperatur 0.5%, properti 0.4%, sputter 0.4%, structur 0.3%, electron 0.3%, zno.film 0.3%, rai 0.3%, optic 0.3%, spectroscopi 0.2%, magnet 0.2%, amorph 0.2%, dlc 0.2%, carbon 0.2%, microscopi 0.2%, orient 0.2%, measur 0.2%
Focuses on various films, discussing formation, doping, deposition etc.

Cluster 159: (90) seed 14.2%, germin 9.8%, forest 7.5%, seedl 3.8%, cotton 3.3%, season 3.1%, leaf 3.0%, biomass 2.8%, wheat 2.3%, canopi 2.2%, cultivar 1.7%, plant 1.5%, tree 1.1%, seed.germin 0.9%, year 0.9%, veget 0.8%, tea 0.7%, grassland 0.7%, grow.season 0.6%, china 0.6%, growth 0.5%, npp 0.5%, rice 0.5%, area 0.5%, stand 0.4%
Focuses on all matter of plants, both food plants and non-food plants, including seeds and their properties, such as germination rate

Cluster 160: (119) stress 50.0%, shear 5.4%, rock 2.4%, residu.stress 1.6%, residu 1.1%, deform 0.9%, plastic 0.8%, strain 0.8%, fractur 0.7%, shear.stress 0.7%, model 0.7%, compress 0.5%, mine 0.4%, element 0.4%, strength 0.4%, stress.field 0.4%, stress.state 0.3%, simul 0.3%, materi 0.3%, load 0.3%, specimen 0.3%, failur 0.3%, tension 0.3%, yield 0.3%, concret 0.3%
Focuses on the mechanical properties of materials, and stresses on them, along with what happens to stressed materials. Also talks about residual stresses, and stress testing and stresses in rocks.

Cluster 161: (78) egg 10.9%, diet 8.8%, larva 6.3%, feed 6.3%, fed 4.9%, fish 4.0%, dietari 3.0%, toxic 1.2%, femal 1.0%, reproduct 1.0%, growth 1.0%, fertil 1.0%, mmt 1.0%, dai 0.9%, rate 0.9%, larval 0.9%, lipid 0.9%, level 0.7%, embryo 0.7%, exposur 0.7%, weight 0.7%, adult 0.6%, shrimp 0.6%, hatch 0.6%, bodi 0.6%
Focuses on the interaction of insects and their predators, and what influences the mortality of insects/fish.

Cluster 162: (122) solut 9.0%, global 8.1%, exist 5.4%, infin 4.6%, asymptot 3.8%, equat 3.6%, nonlinear 2.1%, suffici.condit 1.9%, system 1.8%, suffici 1.8%, condit 1.8%, blow 1.5%, posit 1.4%, prove 1.2%, uniqu 1.2%, attractor 1.2%, equal 1.0%, boundari 1.0%, global.exist 0.9%, cauchi 0.8%, differ.equat 0.8%, oscil 0.8%, exist.uniqu 0.8%, asymptot.behavior 0.7%, element.infin 0.7%
Focuses on mathematical equations and mathematical models and systems.

Cluster 163: (149) strain 22.0%, damag 8.1%, plastic 5.9%, stress 5.3%, deform 3.2%, model 2.9%, strain.rate 2.2%, fatigu 2.0%, stress.strain 1.8%, constitut 1.8%, materi 1.8%, load 1.3%, constitut.model 1.0%, solder 0.9%, rate 0.8%, test 0.7%, plastic.strain 0.7%, harden 0.7%, simul 0.7%, dynam 0.6%, compress 0.5%, concret 0.5%, shear 0.4%, failur 0.4%, finit.element 0.4%
Focuses on mechanical properties of materials with emphasis on damage to the material, plastic deformation and fatigue life.

Cluster 164: (100) algorithm 22.4%, cluster 11.9%, learn 5.0%, data 4.2%, mine 3.0%, set 2.2%, classif 1.6%, rule 1.2%, classifi 1.1%, data.set 1.0%, cluster.algorithm 0.8%, train 0.8%, accuraci 0.8%, data.mine 0.7%, fuzzi 0.7%, pattern 0.6%, discrimin 0.6%, network 0.6%, learn.algorithm 0.6%, kernel 0.6%, recognit 0.5%, model 0.5%, neural 0.5%, text 0.4%, object 0.4%
Focuses on algorithems, with an emphasis on clustering algorithems.

Cluster 165: (170) speci 60.3%, genu 1.1%, plant 1.1%, china 1.0%, phylogenet 0.9%, sequenc 0.8%, genera 0.7%, collect 0.7%, morpholog 0.6%, habitat 0.5%, region 0.4%, taxa 0.4%, tree 0.4%, group 0.3%, two 0.3%, asia 0.3%, two.speci 0.3%, plant.speci 0.3%, forest 0.3%, fungi 0.2%, domin 0.2%, taxonom 0.2%, clade 0.2%, charact 0.2%, divers 0.2%
Focuses on various species of organisms and plants, and their characteristics. Also talks about DNA and comparing it between species.

Cluster 166: (95) wind 30.0%, dust 10.4%, solar 3.1%, storm 2.2%, latitud 1.9%, region 1.0%, aerosol 0.8%, radiat 0.8%, satellit 0.8%, model 0.8%, cloud 0.8%, dust.storm 0.8%, ionospher 0.6%, build 0.6%, data 0.6%, solar.activ 0.5%, sunspot 0.5%, transport 0.5%, atmospher 0.5%, particl 0.5%, period 0.5%, lightn 0.5%, forc 0.4%, summer 0.4%, pollut 0.4%
Focuses on wind, both solar wind and lower atmospheric wind; includes wind modeling, and wind damage, as well as particulates in the wind such as dus and aerosols.

Cluster 167: (466) patient 62.1%, diseas 1.2%, year 1.1%, treatment 1.0%, group 1.0%, clinic 1.0%, month 0.7%, surviv 0.6%, score 0.5%, therapi 0.5%, control 0.5%, ag 0.4%, tumor 0.4%, hospit 0.4%, outcom 0.4%, cancer 0.4%, recurr 0.3%, symptom 0.3%, rate 0.3%, 001 0.3%, risk 0.3%, level 0.3%, mean 0.3%, chines 0.3%, serum 0.2%
Focuses on medical patients and their medical problems.

Cluster 168: (179) bond 7.3%, b3lyp 6.7%, energi 6.1%, isom 6.1%, 31g 2.5%, vibrat 1.9%, geometri 1.6%, densiti.function 1.5%, dft 1.3%, theori 1.2%, level 1.2%, b3lyp.31g 1.2%, hydrogen 1.2%, structur 1.2%, dissoci 1.2%, molecul 1.1%, atom 1.0%, basi.set 1.0%, densiti 0.9%, complex 0.9%, mp2 0.9%, densiti.function.theori 0.9%, function.theori 0.9%, electron 0.9%, stabl 0.8%
Focuses on the bonds between atoms and molecules, with emphasis on their electron transfer.

Cluster 169: (243) bond 16.2%, hydrogen.bond 13.8%, hydrogen 12.9%, molecul 4.5%, anion 4.2%, cation 2.6%, interact 1.9%, compound 1.6%, water 1.6%, titl 1.5%, water.molecul 1.3%, dimension 1.1%, structur 1.1%, titl.compound 1.1%, chain 1.0%, h2o 0.9%, form 0.8%, bond.interact 0.7%, hydrogen.bond.interact 0.6%, three.dimension 0.6%, atom 0.6%, link 0.6%, two 0.5%, center 0.5%, crystal 0.5%
Focuses on the bonds between atoms and molecules, specifically hydrogen bonding, and atom interaction.

Cluster 170: (95) featur 19.9%, word 12.4%, svm 5.3%, classif 5.3%, classifi 2.3%, charact 2.1%, segment 1.8%, featur.select 1.8%, extract 1.8%, speech 1.4%, select 1.3%, chines 1.0%, vector 0.9%, recognit 0.8%, retriev 0.8%, sentenc 0.7%, machin 0.7%, learn 0.7%, support.vector 0.6%, train 0.5%, support.vector.machin 0.5%, vector.machin 0.5%, string 0.5%, discrimin 0.5%, inform 0.5%
Focuses on speech, voice, and written or typed character characterization and classification, with emphasis on feature/ word extraction.

Cluster 171: (144) kinas 9.6%, receptor 7.6%, activ 6.1%, phosphoryl 5.9%, induc 4.6%, signal 3.3%, protein 2.6%, inhibit 2.1%, cell 1.8%, protein.kinas 1.7%, kappab 1.7%, pathwai 1.5%, regul 1.5%, mapk 1.4%, inhibitor 1.3%, mediat 1.2%, express 1.1%, pka 0.9%, pkc 0.9%, camp 0.9%, p38 0.8%, erk 0.6%, beta 0.6%, tyrosin 0.5%, stimul 0.5%
Focuses on kinase and receptor activation,and the signaling of the cells between the receptors.

Cluster 172: (174) quantum 37.0%, spin 9.7%, quantum.dot 2.9%, dot 2.3%, phonon 1.8%, state 1.7%, coupl 1.7%, gate 1.4%, electron 1.1%, field 1.0%, qubit 1.0%, system 0.9%, current 0.9%, exciton 0.6%, gaa 0.5%, magnet 0.5%, classic 0.5%, energi 0.4%, decoher 0.4%, mesoscop 0.4%, charg 0.4%, reson 0.4%, two 0.4%, interact 0.3%, magnet.field 0.3%
Focuses on quantum particules, and quantum dots, and the spin of electrons.

Cluster 173: (327) gene 47.6%, express 10.0%, gene.express 2.1%, transcript 2.0%, protein 1.2%, cell 1.1%, regul 0.9%, promot 0.9%, sequenc 0.9%, mutant 0.6%, strain 0.6%, genom 0.6%, pcr 0.5%, rna 0.5%, mutat 0.5%, cancer 0.4%, activ 0.4%, recombin 0.4%, clone 0.4%, function 0.4%, human 0.4%, microarrai 0.4%, coli 0.3%, mrna 0.3%, tumor 0.3%
Focuses on genes, and gene expression and genetic sequencing.

Cluster 174: (177) wave 52.3%, propag 2.0%, frequenc 1.8%, refract 1.3%, electromagnet.wave 1.0%, electromagnet 0.9%, neg.refract 0.8%, field 0.8%, numer 0.7%, spiral 0.6%, crystal 0.5%, mode 0.5%, dispers 0.5%, acoust 0.5%, photon.crystal 0.5%, harmon 0.4%, spiral.wave 0.4%, photon 0.4%, wave.propag 0.4%, amplitud 0.4%, dimension 0.4%, neg 0.4%, groov 0.3%, gap 0.3%, guid 0.3%
Focuses on electromagnetic, gravitational, and other waves, and their propagation.

Cluster 175: (101) space 27.0%, manifold 10.4%, metric 4.3%, oper 2.8%, map 2.3%, riemannian 2.0%, banach 1.5%, compact 1.4%, invari 1.0%, bergman 1.0%, prove 1.0%, riemannian.manifold 1.0%, banach.space 0.9%, curvatur 0.9%, sphere 0.9%, theorem 0.7%, function 0.6%, isometr 0.6%, norm 0.6%, let 0.6%, hardi 0.6%, bloch 0.6%, sitter 0.5%, dimension 0.5%, local 0.5%
Focuses on mathematics, with emphases on spaces and manifolds.

Cluster 176: (137) express 8.1%, tgf 7.3%, tnf 4.0%, tnf.alpha 3.1%, tgf.beta 3.1%, mrna 3.1%, alpha 2.9%, mmp 2.3%, vegf 1.6%, beta 1.5%, level 1.5%, cytokin 1.4%, beta1 1.2%, lung 1.2%, cell 1.2%, activ 1.2%, tgf.beta1 1.1%, protein 1.0%, rat 1.0%, induc 1.0%, factor 1.0%, receptor 1.0%, growth.factor 0.9%, macrophag 0.9%, bone 0.9%
Focuses on cellular expresson and tumor necrosis factor alpha and transforming growth factor.

Cluster 177: (222) protein 58.4%, bind 1.5%, sequenc 0.7%, proteom 0.6%, express 0.6%, interact 0.6%, human 0.6%, cell 0.5%, membran 0.5%, amino.acid 0.5%, amino 0.5%, bind.protein 0.4%, function 0.4%, electrophoresi 0.4%, membran.protein 0.4%, gel 0.4%, mass 0.4%, spot 0.3%, serum 0.3%, regul 0.3%, domain 0.3%, protein.protein 0.3%, acid 0.3%, hsa 0.3%, detect 0.3%
Focuses on proteins, and protein separation, and protein analysis.

Cluster 178: (223) cell 40.1%, express 3.0%, mice 1.8%, prolifer 1.6%, stem.cell 1.4%, lymphocyt 1.2%, stem 1.2%, differenti 1.2%, bone 1.1%, cd4 0.7%, human 0.7%, activ 0.7%, marrow 0.6%, immun 0.6%, msc 0.6%, cd8 0.6%, induc 0.6%, transplant 0.6%, bone.marrow 0.6%, cultur 0.6%, cytokin 0.5%, progenitor 0.5%, stimul 0.5%, vitro 0.5%, regul 0.4%
Focuses on various kinds of cells and their attributes, along with cellular expression.

Cluster 179: (177) catalyst 41.5%, reaction 3.3%, catalyt 2.6%, polymer 1.8%, activ 1.4%, yield 1.2%, complex 1.0%, reus 0.8%, ionic.liquid 0.8%, ethylen 0.7%, epoxid 0.7%, copolymer 0.6%, liquid 0.6%, acid 0.6%, catalyz 0.6%, aldehyd 0.6%, carbon 0.5%, catalyst.system 0.5%, ionic 0.5%, polyethylen 0.5%, alcohol 0.5%, oxid 0.5%, palladium 0.5%, condit 0.4%, temperatur 0.4%
Focuses on catalysts and their use.

Cluster 180: (161) market 26.1%, firm 10.4%, price 8.5%, econom 4.1%, economi 2.9%, trade 2.3%, innov 1.8%, bid 1.2%, institut 1.0%, stock 0.9%, model 0.9%, enterpris 0.8%, china 0.7%, social 0.6%, product 0.6%, reform 0.6%, privat 0.5%, moral 0.5%, equilibrium 0.5%, system 0.5%, polit 0.5%, portfolio 0.5%, cost 0.4%, govern 0.4%, decis 0.4%
Focuses on economics, specifically different markets, firms, and the price of goods in different economies.

Cluster 181: (79) colloid 8.4%, silver 7.9%, assembl 5.1%, hollow 4.9%, nanoparticl 4.2%, self.assembl 2.4%, sphere 1.8%, templat 1.7%, shell 1.7%, silica 1.6%, particl

1.5%, self 1.4%, nanospher 1.2%, surfac 1.2%, colloid.crystal 1.0%, silver.nanoparticl 0.9%, aggreg 0.8%, poli 0.8%, diamet 0.8%, hollow.sphere 0.8%, nanopl 0.8%, layer 0.7%, spheric 0.7%, crystal 0.7%, ctab 0.6%
Focuses on colloidal silver spheres and their self assembly.

Cluster 182: (353) alloi 56.8%, microstructur 2.4%, phase 1.5%, cast 1.4%, oxid 1.1%, temperatur 0.9%, strength 0.7%, precipit 0.6%, layer 0.5%, grain 0.5%, properti 0.4%, gamma 0.4%, surfac 0.4%, content 0.4%, ag 0.4%, addit 0.4%, eutect 0.3%, magnesium.alloi 0.3%, melt 0.3%, mechan 0.3%, magnesium 0.3%, rate 0.3%, form 0.3%, titanium 0.3%, mechan.properti 0.3%
Focuses on the creation/formation/evaluation of alloys and their microstructure.

Cluster 183: (116) boundari 12.5%, equat 7.5%, solut 3.9%, boundari.condit 3.8%, numer 3.8%, integr 2.6%, integr.equat 2.3%, crack 1.9%, function 1.8%, condit 1.6%, singular 1.3%, stress 1.2%, displac 1.2%, domain 1.0%, wave 1.0%, accuraci 0.6%, quadratur 0.6%, differenti.quadratur 0.6%, deriv 0.6%, green.function 0.6%, point 0.6%, singular.integr 0.5%, singular.integr.equat 0.5%, piezoelectr 0.5%, orthotrop 0.5%
Focuses on mathematics: boundary conditions, equations, etc.

Cluster 184: (142) estim 28.6%, error 17.8%, regress 1.9%, likelihood 1.8%, model 1.7%, sampl 1.6%, data 1.3%, asymptot 1.3%, statist 0.9%, maximum.likelihood 0.9%, paramet 0.9%, simul 0.9%, bootstrap 0.8%, distribut 0.7%, test 0.7%, varianc 0.6%, calibr 0.6%, linear 0.6%, squar 0.5%, parametr 0.5%, outlier 0.5%, nonparametr 0.5%, empir 0.5%, accuraci 0.5%, likelihood.estim 0.4%
Focuses on estimation, and the error associated with estimation.

Cluster 185: (122) numer 8.0%, equat 6.9%, solut 4.5%, finit 3.4%, converg 3.0%, stoke 2.9%, scheme 2.8%, navier 2.6%, navier.stoke 2.5%, approxim 2.3%, finit.element 1.9%, stoke.equat 1.6%, element 1.6%, order 1.6%, navier.stoke.equat 1.6%, discret 1.5%, solv 0.8%, flow 0.7%, second.order 0.7%, linear 0.7%, interpol 0.7%, second 0.6%, accuraci 0.6%, error 0.6%, numer.solut 0.6%
Focuses on numerical equations, especially solution of numerical equations for fluid flows, such as the navier stokes equation.

Cluster 186: (128) finit.element 15.5%, element 12.7%, finit 10.5%, model 2.5%, roll 2.5%, element.model 1.7%, finit.element.model 1.6%, simul 1.6%, rail 1.3%, fem 1.2%, dam 0.8%, strip 0.8%, forc 0.8%, stress 0.8%, contact 0.7%, rotor 0.6%, calcul 0.6%, deform 0.6%, materi 0.6%, numer 0.6%, plate 0.6%, bridg 0.5%, elast 0.5%, field 0.5%, shape 0.5%
Focuses on finite element models.

Cluster 187: (196) control 43.8%, system 7.0%, control.system 2.2%, model 1.4%, disturb 1.3%, pid 1.2%, nonlinear 1.1%, design 1.0%, simul 1.0%, robot 1.0%, dynam 1.0%, pid.control 0.9%, stabil 0.7%, loop 0.7%, optim 0.7%, robust 0.5%, time 0.5%,

track 0.4%, paramet 0.4%, control.scheme 0.4%, algorithm 0.4%, scheme 0.4%, oper 0.4%, output 0.3%, actuat 0.3%
Focuses on various control systems and the controllers themselves.

Cluster 188: (123) polym 33.7%, solvent 3.4%, monom 2.5%, solubl 2.2%, poli 1.7%, imprint 1.4%, membran 1.3%, polymer 1.1%, synthes 1.1%, chain 1.0%, nmr 1.0%, organ.solvent 0.9%, polycondens 0.8%, acid 0.8%, imprint.polym 0.7%, ether 0.7%, polyimid 0.7%, molecular 0.6%, hyperbranch 0.6%, organ 0.5%, chromophor 0.5%, templat 0.5%, weight 0.4%, thermal 0.4%, properti 0.4%
Focuses on polymers, their formulation, their formation, and their uses.

Cluster 189: (400) imag 59.4%, algorithm 1.8%, pixel 1.3%, segment 1.3%, color 1.1%, reconstruct 1.0%, data 0.6%, object 0.6%, textur 0.6%, wavelet 0.5%, featur 0.5%, nois 0.5%, process 0.5%, model 0.5%, fingerprint 0.5%, watermark 0.4%, detect 0.4%, transform 0.4%, resolut 0.4%, system 0.4%, match 0.4%, spatial 0.3%, extract 0.3%, inform 0.3%, robust 0.3%
Focuses on imaging, both the instruments used and the mechanics behind taking images.

Cluster 190: (132) crystal 17.3%, melt 4.9%, differenti.scan 3.2%, differenti.scan.calorimetri 2.9%, scan.calorimetri 2.9%, calorimetri 2.8%, dsc 2.6%, scan 1.8%, temperatur 1.7%, crystallin 1.6%, differenti 1.5%, phase 1.5%, thermal 1.1%, scan.calorimetri.dsc 1.1%, calorimetri.dsc 1.1%, polym 1.1%, copolym 0.8%, pcl 0.7%, isotherm 0.7%, crosslink 0.7%, poli 0.7%, ipp 0.6%, waxd 0.5%, cholester 0.5%, isotherm.crystal 0.5%
Focuses on the crystal structures of various compounds and their physical properties such as melting properties with the analysis done by differential scanning calorimetry.

Cluster 191: (83) band 14.4%, dope 9.1%, electron 6.2%, gap 3.3%, energi 2.4%, state 2.2%, electron.structur 1.8%, surfac 1.6%, band.gap 1.5%, densiti 1.3%, atom 1.3%, valenc 1.2%, orbit 1.2%, structur 1.1%, densiti.state 1.1%, valenc.band 1.0%, fermi 0.6%, photoemiss 0.6%, phonon 0.6%, semiconductor 0.6%, do 0.6%, gaa 0.5%, conduct 0.5%, band.structur 0.5%, calcul 0.5%
Focuses on doped materials, especially crystals and their various parameters that fall in different bands. Also emphasizes optical band gaps.

Cluster 192: (132) crystal 34.6%, grown 2.7%, optic 2.6%, linbo3 2.6%, defect 2.5%, pwo 1.8%, photon.crystal 1.8%, absorpt 1.7%, photon 1.6%, dope 1.6%, singl.crystal 1.2%, growth 1.2%, crystal.grown 1.2%, band 0.9%, singl 0.9%, pwo.crystal 0.8%, structur 0.8%, linbo3.crystal 0.7%, spectra 0.7%, caf2 0.5%, kdp 0.4%, face 0.4%, domain 0.3%, diffract 0.3%, trap 0.3%
Focuses on various crystals and their light carrying/ other optical properties, as well as defects in them.

Cluster 193: (176) powder 34.8%, size 3.3%, particl 2.9%, precursor 1.7%, particl.size 1.5%, combust 1.5%, calcin 1.5%, temperatur 1.4%, xrd 1.3%, phase 1.1%, synthes 1.0%, precipit 0.8%, nano 0.7%, gel 0.7%, synthesi 0.7%, tem 0.7%, powder.synthes

0.6%, mill 0.5%, product 0.5%, sem 0.5%, nanos 0.5%, la2o3 0.5%, rai 0.5%, oxid 0.4%, sol 0.4%
Focuses on powders and their fabrication and synthesis and mechanical properties.

Cluster 194: (109) zeolit 24.7%, catalyt 10.4%, activ 4.4%, oxid 3.4%, zsm 1.9%, acid.site 1.7%, acid 1.7%, catalyt.activ 1.6%, catalyst 1.6%, site 1.3%, select 1.0%, reaction 0.9%, hzsm 0.8%, methanol 0.8%, cobalt 0.8%, tpd 0.7%, oxygen 0.7%, co2 0.7%, zeolit.beta 0.6%, adsorpt 0.5%, hydrogen 0.5%, reactor 0.5%, membran 0.4%, base 0.4%, complex 0.4%
Focuses on zeolites and their formation and chemical makeup, as well as various catalysts.

Cluster 195: (153) temperatur 6.9%, spin 5.8%, magnet 5.7%, ferromagnet 5.1%, dope 4.8%, field 3.4%, transit 2.9%, magnetoresist 2.4%, resist 1.9%, sampl 1.4%, insul 1.3%, phase 1.3%, electr 1.3%, superconduct 1.3%, temperatur.depend 1.0%, state 0.9%, depend 0.9%, antiferromagnet 0.8%, metal 0.8%, electron 0.7%, transport 0.7%, electr.field 0.7%, paramagnet 0.6%, ion 0.6%, la0 0.6%
Focuses on the magnetic properties of materials along with feromagnets, as well as the doping of various materials to make them magnetic.

Cluster 196: (91) optic 22.7%, soliton 11.0%, beam 3.0%, modul 2.1%, nonlinear 1.6%, america 1.5%, phase 1.4%, detector 1.3%, dark 1.1%, superresolut 1.0%, system 1.0%, photorefract 1.0%, intens 0.8%, light 0.7%, trap 0.7%, spatial.soliton 0.7%, filter 0.7%, theoret 0.7%, phase.shift 0.6%, spatial 0.6%, shift 0.6%, incoher 0.6%, numer 0.5%, apertur 0.5%, vortex 0.5%
Focuses on optics, both biological: (human eye) and mechanical: (optical crystals etc, with some emphasis on solitons).

Cluster 197: (144) plant 18.1%, root 16.7%, rice 3.7%, shoot 3.2%, leaf 3.1%, leav 2.0%, water 1.6%, concentr 1.2%, uptak 1.1%, nutrient 0.9%, stomat 0.8%, toler 0.8%, medium 0.7%, content 0.7%, cultivar 0.7%, growth 0.7%, treatment 0.6%, biomass 0.6%, irrig 0.6%, wheat 0.5%, increas 0.5%, photosynthet 0.5%, stem 0.5%, ecotyp 0.5%, stress 0.4%
Focuses on plants, and plant roots. Includes waste remediation using plants, various health benefits of plants, and plant characterization and analysis.

Cluster 198: (326) algorithm 67.6%, comput 1.9%, new 0.6%, model 0.6%, time 0.6%, simul 0.5%, effici 0.5%, new.algorithm 0.4%, path 0.4%, data 0.4%, system 0.3%, optim 0.3%, network 0.3%, algorithm.algorithm 0.3%, adapt 0.3%, rout 0.3%, parallel 0.3%, nois 0.2%, match 0.2%, point 0.2%, gener 0.2%, complex 0.2%, multipl 0.2%, scheme 0.2%, two 0.2%
Focuses on various computer algorithems.

Cluster 199: (93) field 5.8%, spin 5.7%, dark 4.8%, theori 4.1%, dark.energi 4.0%, cosmolog 3.7%, univers 2.4%, energi 2.1%, field.theori 1.6%, inflat 1.6%, model 1.4%, matter 1.4%, gravit 1.3%, fermion 1.2%, scalar 1.2%, dark.matter 1.1%,

constant 1.1%, cosmolog.constant 1.0%, cosmic 0.9%, scalar.field 0.9%, brane 0.9%, formula 0.8%, perturb 0.7%, paramet 0.7%, particl 0.7%
Focuses on various topics in astrophysics, and physics in general.

Cluster 200: (202) h2o 14.1%, ligand 8.7%, coordin 6.3%, bridg 4.1%, complex 3.2%, coordin.polym 2.9%, chain 2.5%, polym 2.1%, ion 2.0%, clo4 1.7%, structur 1.6%, no3 1.3%, center 1.3%, dimension 1.1%, magnet 1.1%, synthes 1.1%, compound 1.0%, bi 0.9%, two 0.9%, bipi 0.7%, anion 0.6%, pyridyl 0.6%, interact 0.5%, crystal 0.5%, phen 0.5%
Focuses on chemistry with emphasis on chemical mechanics.

Cluster 201: (84) model 8.7%, inform 6.7%, forecast 6.2%, data 4.5%, land 4.2%, gi 3.0%, climat 2.5%, spatial 2.0%, ionospher 1.5%, flood 1.5%, map 1.2%, area 1.2%, npp 0.9%, river 0.9%, system 0.8%, knowledg 0.8%, hydrolog 0.8%, rough.set 0.7%, set 0.7%, integr 0.7%, climat.model 0.6%, rainfal 0.6%, time.seri 0.6%, inform.system 0.6%, gp 0.6%
Focuses on environmental forcasting and modeling.

Cluster 202: (128) state 25.8%, coupl 5.1%, synchron 3.5%, coher.state 3.1%, coher 2.4%, oscil 1.8%, wave 1.7%, vibrat 1.7%, squeez 1.5%, quantum 1.3%, phase 1.2%, ground 1.0%, transit 1.0%, mode 1.0%, energi 0.9%, system 0.9%, excit 0.7%, two 0.6%, spin 0.6%, trap 0.6%, band 0.6%, ground.state 0.5%, hamiltonian 0.5%, even.odd 0.5%, odd 0.5%
Focuses on the states of various systems, and their synchronization and coupling.

Cluster 203: (112) arteri 11.5%, stent 5.8%, lesion 4.7%, patient 4.1%, coronari 2.5%, year.old 1.8%, case 1.8%, year 1.6%, tumour 1.6%, aortic 1.6%, old 1.4%, pain 1.3%, left 1.3%, carotid 1.0%, stenosi 1.0%, blood 1.0%, right 0.9%, vessel 0.9%, diagnosi 0.8%, coronari.arteri 0.8%, group 0.8%, angiographi 0.7%, month 0.7%, diseas 0.7%, aneurysm 0.7%
Focuses on the circulatory system, emphasizing arteries and stents, and clinical problems associated with various patients.

Cluster 204: (136) emiss 23.9%, luminesc 6.7%, photoluminesc 3.3%, excit 2.5%, dope 2.2%, peak 1.6%, band 1.5%, zno 1.5%, zn 1.5%, intens 1.5%, nanocryst 1.4%, spectra 1.3%, blue 1.2%, temperatur 1.1%, emiss.peak 0.8%, nanoparticl 0.7%, fluoresc 0.7%, spectrum 0.6%, cdte 0.6%, pbwo4 0.6%, size 0.5%, dy3 0.5%, exciton 0.5%, room 0.5%, sio2 0.5%
Focuses on the emission properties of materials, especially photoluminescence.

Cluster 205: (266) complex 44.7%, ligand 5.8%, phen 1.9%, iii 1.5%, coordin 1.0%, metal 1.0%, ion 0.9%, eta 0.9%, synthes 0.9%, phenanthrolin 0.7%, structur 0.7%, dna 0.7%, bi 0.7%, bpy 0.6%, spectra 0.6%, bind 0.5%, lanthanid 0.5%, copper 0.5%, two 0.5%, nmr 0.4%, luminesc 0.4%, bridg 0.4%, atom 0.4%, reaction 0.4%, fluoresc 0.3%

Focuses on various metal complexes and chemical properties of materials, with emphasis on ligands.

Cluster 206: (88) shell 10.2%, particl 8.4%, caco3 5.1%, core 5.0%, microspher 4.1%, sio2 2.8%, dust 2.1%, nano 1.9%, core.shell 1.8%, polymer 1.5%, composit 1.5%, surfac 1.3%, emuls 1.3%, graft 1.1%, size 0.9%, concentr 0.8%, monodispers 0.8%, dispers 0.6%, sphere 0.6%, polystyren 0.6%, magnetit 0.6%, floc 0.6%, composit.particl 0.5%, calcium 0.5%, silica 0.5%
Focuses on shells and encapsulating various compounds within them.

Cluster 207: (130) compound 35.7%, activ 3.2%, synthes 2.6%, nmr 2.3%, methyl 2.0%, substitut 1.7%, deriv.synthes 1.3%, new.compound 1.2%, structur 1.1%, spectra 1.0%, nmr.spectra 1.0%, element 0.9%, deriv 0.9%, herbicid 0.8%, seri 0.8%, target.compound 0.8%, compound.nmr 0.7%, new 0.7%, acid 0.6%, group 0.6%, structur.activ 0.6%, bioassai 0.5%, spectra.element 0.5%, nmr.spectra.element 0.5%, biolog 0.4%
Focuses on various chemical compounds and their synthesis.

Cluster 208: (267) particl 50.6%, size 6.9%, particl.size 5.8%, size.distribut 1.0%, composit 0.9%, dispers 0.8%, distribut 0.8%, surfac 0.8%, nano 0.5%, nanoparticl 0.5%, silica 0.4%, temperatur 0.4%, concentr 0.4%, particl.size.distribut 0.3%, spheric 0.3%, fine 0.3%, increas 0.3%, water 0.2%, content 0.2%, morpholog 0.2%, phase 0.2%, nano.particl 0.2%, polymer 0.2%, diamet 0.2%, precipit 0.2%
Focuses on particulate matter of varying types, and its size and size distribution.

Cluster 209: (171) china 9.5%, climat 4.6%, monsoon 4.5%, summer 4.0%, sea 2.3%, east 1.7%, urban 1.6%, region 1.6%, warm 1.5%, land 1.4%, south 1.3%, winter 1.2%, glacial 1.2%, asian 1.1%, north 1.1%, dust 1.0%, summer.monsoon 1.0%, ic 1.0%, area 0.9%, site 0.9%, plateau 0.9%, loess 0.8%, season 0.8%, basin 0.8%, delta 0.7%
Focuses on climate analysis (especially monsoons) and indoor air pollutant studies, mainly in china and the surrounding areas.

Cluster 210: (223) flow 43.5%, veloc 2.9%, fluid 2.5%, model 2.1%, jet 1.8%, ga 1.5%, pressur 1.2%, bubbl 0.9%, bed 0.9%, simul 0.8%, flow.rate 0.8%, channel 0.7%, particl 0.7%, liquid 0.6%, nozzl 0.6%, numer 0.6%, convect 0.5%, experiment 0.5%, flow.field 0.5%, field 0.5%, flow.pattern 0.5%, rate 0.5%, wall 0.4%, paramet 0.4%, air 0.4%
Focuses on flow dynamics and fluid flow modeling.

Cluster 211: (100) suspens 5.5%, nano 5.3%, surfac.area 4.9%, dispers 4.6%, surfac 3.7%, slurri 3.3%, calcin 2.4%, zirconia 2.4%, area 2.3%, zro2 1.9%, al2o3 1.9%, powder 1.5%, alumina 1.4%, aqueou 1.3%, solid 1.2%, aln 1.2%, stabil 1.1%, size 1.0%, particl 0.8%, viscos 0.8%, high.surfac.area 0.8%, oxid 0.7%, high.surfac 0.7%, solid.load 0.6%, bet 0.6%

Focuses on various suspensions, and the nanoparticles in them. Also talks about powders and the particles' surface area.

Cluster 212: (122) design 50.6%, system 2.0%, gear 1.3%, model 1.0%, simul 0.9%, assembl 0.8%, architectur 0.7%, circuit 0.7%, optim 0.6%, manufactur 0.6%, product 0.4%, power 0.4%, softwar 0.4%, manipul 0.4%, design.system 0.4%, chip 0.4%, construct 0.4%, gener 0.4%, modul 0.4%, dynam 0.4%, applic 0.3%, regist 0.3%, pile 0.3%, new 0.3%, oper 0.3%
Focuses on the design of new components, systems, and structures.

Cluster 213: (161) mol 17.7%, electrod 7.1%, detect.limit 2.5%, detect 2.3%, peak 2.0%, ion 1.9%, rang 1.8%, limit 1.7%, absorpt 1.5%, complex 1.4%, linear 1.2%, iii 1.2%, concentr 1.1%, rang.mol 1.0%, detect.limit.mol 1.0%, limit.mol 1.0%, sensit 0.9%, solut 0.8%, buffer 0.8%, reaction 0.8%, select 0.8%, buffer.solut 0.7%, acid 0.6%, voltammetri 0.6%, mol.detect.limit 0.6%
Focuses on molecular detection, as well as electrode fabrication and use.

Cluster 214: (204) layer 18.2%, film 8.5%, substrat 5.0%, thick 4.4%, deposit 2.8%, gan 2.8%, anneal 2.6%, aln 1.9%, silicon 1.7%, multilay 1.3%, buffer.layer 1.0%, surfac 0.9%, layer.thick 0.9%, temperatur 0.8%, sputter 0.8%, buffer 0.8%, grown 0.7%, zno 0.7%, epitaxi 0.6%, gan.film 0.6%, lcmo 0.5%, interfac 0.5%, growth 0.5%, nitrid 0.5%, tin 0.5%
Focuses on thin films and their substrates, and film deposition.

Cluster 215: (113) patient 6.7%, group 4.8%, renal 4.7%, transplant 3.3%, treatment 3.1%, month 3.0%, postop 2.5%, liver 2.4%, case 1.9%, mmf 1.7%, graft 1.4%, donor 1.3%, implant 1.3%, outcom 1.3%, clinic 1.1%, surviv 1.0%, year 0.9%, surgic 0.8%, nerv 0.8%, complic 0.8%, liver.transplant 0.8%, surgeri 0.8%, rate 0.8%, blood 0.7%, laparoscop 0.7%
Focuses on the renal system, and patients who have renal problems and some of their treatments.

Cluster 216: (141) group 40.5%, control.group 2.4%, control 2.1%, treatment 1.2%, group.group 1.2%, diet 1.1%, rat 0.9%, serum 0.8%, pig 0.7%, dose 0.6%, dai 0.6%, subject 0.6%, week 0.6%, children 0.6%, placebo 0.5%, supplement 0.5%, level 0.5%, fed 0.5%, blood 0.5%, femal 0.5%, group.control 0.5%, male 0.5%, plasma 0.4%, egg 0.4%, administr 0.4%
Focuses on medical/ biological experiments, and talks about the different groups in the experiment.

Cluster 217: (140) heat 35.7%, temperatur 4.4%, heat.transfer 4.1%, thermal 2.7%, transfer 2.6%, tube 1.9%, cool 1.8%, refriger 1.3%, water 0.9%, boil 0.8%, heat.capac 0.8%, conduct 0.7%, thermal.conduct 0.7%, capac 0.6%, heat.treatment 0.5%, moistur 0.5%, phase 0.5%, experiment 0.5%, liquid 0.5%, surfac 0.4%, evapor 0.4%, condens 0.4%, degreesc 0.4%, treatment 0.3%, ga 0.3%

Focuses on heat transfer mechanics and applications, as well as heat transfer experiments.

Cluster 218: (147) sea 6.3%, ocean 4.1%, model 2.8%, season 2.3%, climat 2.1%, tidal 1.9%, permafrost 1.8%, enso 1.7%, data 1.3%, surfac 1.2%, circul 1.2%, pacif 1.2%, sediment 1.2%, anomali 1.0%, cloud 1.0%, water 1.0%, warm 1.0%, east 1.0%, front 1.0%, summer 0.9%, transport 0.9%, rainfal 0.9%, atmospher 0.8%, north 0.8%, ic 0.8%
Focuses on creating climate models,especially over water or near coasts, and various ways to determine moisture concentrations and ways of measuring various quantities that affect climate, such as moisture etc.

Cluster 219: (198) protein 13.6%, peptid 3.9%, bind 3.3%, activ 3.1%, fusion 3.1%, express 2.7%, purifi 2.7%, coli 2.5%, mutant 2.0%, domain 2.0%, recombin 2.0%, fusion.protein 1.9%, enzym 1.7%, termin 1.1%, refold 1.0%, residu 0.9%, escherichia.coli 0.8%, human 0.8%, escherichia 0.8%, cell 0.8%, pollen 0.8%, mutat 0.7%, gst 0.6%, site 0.6%, subunit 0.5%
Focuses on proteins and their characterization and use.

Cluster 220: (225) equat 52.0%, solut 5.0%, wave 1.1%, nonlinear 0.9%, deriv 0.9%, linear 0.6%, system 0.6%, paramet 0.6%, schroding 0.5%, matrix 0.4%, schroding.equat 0.4%, matrix.equat 0.4%, theori 0.4%, potenti 0.4%, function 0.4%, space 0.4%, condit 0.4%, motion 0.4%, model 0.3%, boltzmann 0.3%, initi 0.3%, integr 0.3%, relat 0.3%, order 0.3%, term 0.3%
Focuses on mathematics, especially solution techniques for mathematical equations.

Cluster 221: (359) cell 62.4%, cultur 1.3%, express 1.2%, human 0.7%, protein 0.6%, activ 0.6%, membran 0.5%, cell.line 0.4%, concentr 0.4%, inhibit 0.4%, growth 0.4%, endotheli 0.4%, transfect 0.3%, line 0.3%, tissu 0.3%, assai 0.3%, infect 0.3%, prolifer 0.3%, gene 0.3%, embryo 0.3%, cytoplasm 0.2%, endotheli.cell 0.2%, control 0.2%, regul 0.2%, product 0.2%
Focuses on various kinds of cells, expression of those cells, and gene expression.

Cluster 222: (137) layer 9.0%, gan 6.8%, etch 3.8%, quantum 3.7%, quantum.dot 2.8%, dot 2.7%, gaa 2.2%, ina 2.0%, qd 1.7%, grown 1.3%, epitaxi 1.3%, electron 1.2%, algan 1.1%, implant 1.1%, photoluminesc 1.0%, silicon 1.0%, surfac 1.0%, sige 0.8%, fabric 0.8%, peak 0.6%, thick 0.6%, tunnel 0.6%, heterostructur 0.6%, molecular.beam.epitaxi 0.5%, beam.epitaxi 0.5%
Focuses on etched layers, usually of silicon, and includes quantum dots as well.

Cluster 223: (198) cluster 11.1%, molecul 3.9%, atom 3.9%, electron 3.4%, orbit 3.0%, densiti.function 2.9%, structur 2.8%, densiti 2.7%, molecular 2.5%, densiti.function.theori 2.2%, function.theori 2.2%, energi 2.0%, state 1.6%, calcul 1.2%, theori 1.2%, bond 1.2%, function 1.2%, dft 1.1%, charg 0.8%, electron.structur 0.7%, ground.state 0.7%, absorpt 0.6%, molecular.orbit 0.6%, compound 0.6%, ground 0.6%

Focuses on the structure of various molecules and atoms or clusters of atoms. Also discusses the orbit of electrons, and the density and structure based on density functional theory.

Cluster 224: (161) film 33.3%, surfac 3.3%, composit.film 3.1%, polym 2.1%, monolay 1.9%, optic 1.3%, composit 1.1%, light 1.0%, langmuir 0.8%, polar 0.7%, shg 0.6%, water 0.6%, poli 0.6%, blodgett 0.6%, graft 0.5%, langmuir.blodgett 0.5%, grate 0.4%, fabric 0.4%, properti 0.4%, amphiphil 0.4%, subphas 0.4%, afm 0.3%, angl 0.3%, surfac.pressur 0.3%, pmma 0.3%
Focuses on films, specifically composite films and polymer films.

Cluster 225: (107) nmr 15.7%, acid 10.8%, synthes 2.6%, methyl 2.1%, spectra 1.8%, compound 1.3%, calix 1.3%, carboxyl.acid 1.2%, deriv 1.2%, carboxyl 1.2%, structur 1.1%, amino 1.1%, nmr.nmr 1.1%, spectroscopi 1.0%, aren 0.9%, ester 0.8%, recognit 0.8%, chemic 0.7%, nmr.spectra 0.7%, calix.aren 0.6%, macrocycl 0.6%, spirobenzopyran 0.6%, methyl.ester 0.6%, fluoresc 0.6%, element 0.6%
Focuses on the structure and characteristics of various molecules, mainly using NMR mass spectrometry.

Cluster 226: (92) molecular 14.2%, molecular.weight 6.4%, weight 5.2%, degrad 2.7%, fraction 2.5%, group 1.4%, polysaccharid 1.2%, averag.molecular 1.2%, nmr 1.0%, acid 0.9%, molecular.recognit 0.9%, chain 0.9%, solubl 0.7%, water 0.6%, lignin 0.6%, crosslink 0.6%, recognit 0.6%, structur 0.5%, averag.molecular.weight 0.5%, oil 0.5%, averag 0.5%, residu 0.5%, biodegrad 0.4%, eta 0.4%, synthes 0.4%
Focuses on the characteristics of various molecules, such as molecular weight, degradation of the molecules, etc.

Cluster 227: (195) yield 23.9%, reaction 8.9%, afford 4.3%, mild 1.8%, acid 1.8%, alpha 1.7%, high.yield 1.6%, react 1.6%, product 1.5%, substitut 1.4%, correspond 1.0%, catalyt 1.0%, condit 0.9%, amin 0.9%, ester 0.8%, compound 0.8%, mild.condit 0.7%, catalyz 0.6%, reagent 0.6%, thf 0.6%, moder 0.6%, stereoselect 0.6%, high 0.6%, moder.yield 0.6%, alcohol 0.5%
Focuses on various chemical reactions and specifically on their yields.

Cluster 228: (260) rat 31.4%, brain 2.8%, dose 2.2%, inject 1.7%, induc 1.6%, express 1.6%, administr 1.4%, receptor 1.2%, drug 1.1%, group 1.0%, ischemia 1.0%, liver 0.9%, reperfus 0.8%, level 0.8%, injuri 0.7%, mrna 0.7%, diabet 0.7%, activ 0.7%, heart 0.5%, blood 0.5%, treatment 0.5%, protein 0.5%, oral 0.5%, cell 0.5%, myocardi 0.4%
Focuses on experiments performed on rats, especially impacts on their brain.

Cluster 229: (129) pressur 24.6%, high.pressur 4.1%, miner 3.5%, hydrat 3.5%, ga 3.1%, gpa 3.0%, oxygen 2.6%, temperatur 1.7%, ga.hydrat 1.1%, iron 1.0%, high 1.0%, water 0.7%, phase 0.6%, quartz 0.6%, content 0.5%, rock 0.5%, plagioclas 0.5%, fluid 0.5%, zone 0.5%, transit 0.4%, pressur.gpa 0.4%, nanocryst 0.4%, resist 0.4%, format 0.4%, silic 0.4%

Focuses on pressure and high pressure. Sometimes discusses chemical reactions or geologic phenomina.

Cluster 230: (121) chitosan 12.5%, absorpt 4.9%, fluoresc 4.6%, photon 3.6%, radic 3.2%, two.photon 2.7%, aggreg 1.7%, spectra 1.7%, excit 1.5%, porphyrin 1.5%, state 1.2%, phenyl 1.1%, scaveng 1.1%, molecular 1.0%, two 0.7%, bi 0.7%, antioxid 0.7%, solvent 0.6%, group 0.6%, complex 0.6%, phthalocyanin 0.6%, excit.state 0.6%, emiss 0.6%, dye 0.6%, triplet 0.5%
Focuses on chitosan, and the separation of various molecules specifically by means of absorption.

Cluster 231: (251) composit 36.1%, sic 3.8%, materi 2.3%, strength 2.1%, matrix 1.9%, fibr 1.5%, fractur 1.3%, properti 1.3%, reinforc 1.1%, mechan 0.9%, mechan.properti 0.8%, fabric 0.7%, particl 0.7%, carbon 0.7%, oxid 0.6%, powder 0.6%, al2o3 0.6%, fiber 0.6%, properti.composit 0.5%, interfac 0.5%, tough 0.5%, microstructur 0.4%, bend 0.4%, metal 0.4%, thermal 0.4%
Focuses on the composition, mechanical properties, and synthesis of various materials.

Cluster 232: (168) women 11.9%, ag 5.6%, subject 4.5%, male 2.5%, pregnanc 1.6%, risk 1.5%, serum 1.4%, blood 1.4%, femal 1.3%, level 1.3%, year 1.3%, infant 1.2%, chines 1.1%, men 1.0%, bmd 0.9%, bodi 0.9%, group 0.9%, intak 0.9%, obes 0.9%, birth 0.8%, bone 0.7%, sex 0.7%, injuri 0.7%, bmi 0.6%, cadmium 0.6%
Focuses on various clinical medical studies, usually involving women.

Cluster 233: (136) pore 7.9%, materi 7.0%, scaffold 6.7%, dentin 3.9%, porou 3.8%, adhes 2.7%, cement 1.8%, membran 1.8%, poros 1.7%, strength 1.6%, ldh 1.4%, surfac 1.4%, pore.size 1.0%, hap 1.0%, etch 1.0%, sem 0.9%, calcium 0.8%, composit 0.8%, water 0.8%, bone 0.7%, foam 0.7%, chitosan 0.7%, structur 0.6%, size 0.6%, properti 0.5%
Focuses on the separation of materials, pore sizes in filter media and the structure of the filter media itself.

Cluster 234: (113) mesopor 6.0%, silica 4.0%, electron 3.2%, surfac 3.1%, microscopi 2.6%, morpholog 2.2%, templat 2.2%, electron.microscopi 1.7%, mesopor.silica 1.7%, membran 1.7%, scan 1.6%, pore 1.4%, transmiss.electron 1.4%, transmiss 1.3%, surfact 1.0%, diamet 1.0%, scan.electron 0.9%, aerogel 0.8%, spectroscopi 0.8%, synthes 0.8%, rai 0.7%, sem 0.7%, structur 0.7%, crystal 0.6%, transmiss.electron.microscopi 0.6%
Focuses on mesoporous silicas.

Cluster 235: (155) synthesi 12.3%, reaction 6.4%, alkyl 3.5%, synthes 3.4%, compound 2.8%, step 2.5%, substitut 2.4%, methyl 1.2%, total.synthesi 1.1%, yield 1.1%, cycliz 1.1%, kei 1.0%, wittig 0.9%, ether 0.9%, alpha 0.8%, on 0.8%, product 0.8%, synthet 0.8%, kei.step 0.7%, reduct 0.7%, deriv 0.7%, pot 0.6%, nmr 0.6%, on.pot 0.6%, regioselect 0.6%
Focuses on synthesis of chemicals and chemical reactions.

Cluster 236: (165) reaction 44.8%, product 4.0%, condit 0.9%, reaction.temperatur 0.8%, solvent 0.8%, oxid 0.7%, temperatur 0.7%, reaction.rate 0.6%, catalyz 0.6%, mechan 0.5%, ga 0.5%, yield 0.5%, methanol 0.5%, reaction.mechan 0.5%, intermedi 0.5%, reaction.condit 0.4%, rate 0.4%, polymer 0.4%, reactor 0.4%, reaction.time 0.3%, radic 0.3%, ratio 0.3%, synthesi 0.3%, supercrit 0.3%, chain 0.3%
Focuses on various chemical reactions, and the product of those reactions and the conditions needed for the reaction, more specifically reaction temperature.

Cluster 237: (173) load 12.8%, beam 3.3%, buckl 2.9%, lamin 2.6%, bend 2.5%, forc 2.3%, deform 1.9%, plate 1.7%, dynam 1.6%, elast 1.6%, axial 1.4%, model 1.4%, displac 1.2%, wall 1.2%, vibrat 1.1%, section 1.0%, curv 1.0%, stiff 1.0%, column 0.9%, indent 0.8%, numer 0.8%, cut 0.7%, test 0.7%, plastic 0.7%, stiffen 0.7%
Focuses on the loading of structural members along with their mechanical properties and the failure modes of various beams, laminates and other materials.

Cluster 238: (130) function 11.7%, element 7.8%, inequ 6.7%, finit 4.2%, polynomi 3.3%, interpol 3.0%, formula 2.7%, set 1.7%, finit.element 1.3%, order 1.2%, class 1.1%, math 1.1%, bound 1.0%, ident 0.7%, sum 0.7%, asymptot 0.7%, proof 0.7%, converg 0.7%, oper 0.7%, type.inequ 0.6%, integr 0.6%, prove 0.6%, minim 0.5%, theori 0.5%, gener 0.5%
Focuses on the various functions of finite element models, and the mathmatics associated with them.

Cluster 239: (195) field 23.5%, magnet 17.5%, magnet.field 5.8%, current 1.8%, electr 1.6%, model 1.1%, flux 1.1%, electromagnet 0.9%, ground 0.8%, reconnect 0.7%, electr.field 0.6%, ht 0.5%, geomagnet 0.5%, numer 0.5%, cme 0.4%, densiti 0.4%, forc 0.4%, power 0.4%, dipol 0.4%, plasma 0.3%, acceler 0.3%, two 0.3%, levit 0.3%, system 0.3%, magnet.flux 0.3%
Focuses on magnets and magnetic fields.

Cluster 240: (142) energi 18.0%, state 5.1%, calcul 3.2%, potenti 2.0%, ground.state 1.9%, interact 1.8%, ground 1.7%, model 1.5%, theori 1.5%, orbit 1.4%, excit 1.0%, transit 1.0%, function 0.8%, pair 0.7%, electron 0.7%, potenti.energi 0.6%, system 0.6%, two 0.6%, paramet 0.6%, correl 0.5%, correct 0.5%, charg 0.5%, level 0.5%, experiment 0.5%, basi.set 0.5%
Focuses on the energy states of various charged particles.

Cluster 241: (155) project 8.4%, build 6.1%, construct 4.5%, environment 4.3%, kong 2.6%, hong 2.5%, china 2.4%, hong.kong 2.4%, plan 1.5%, articl 1.3%, sustain 1.3%, survei 1.2%, partner 0.9%, social 0.8%, environ 0.8%, disput 0.7%, scienc 0.7%, practic 0.7%, air 0.6%, system 0.6%, tunnel 0.6%, urban 0.6%, factor 0.6%, product 0.6%, commun 0.6%
Focuses on various construction projects, mainly in china.

Cluster 242: (174) frequenc 16.1%, mode 11.7%, reson 9.3%, nois 3.1%, reson.frequenc 1.6%, oscil 1.6%, acoust 0.9%, caviti 0.9%, band 0.9%, vibrat 0.9%, measur 0.7%, signal 0.7%, harmon 0.6%, nonlinear 0.6%, amplitud 0.5%, voltag 0.5%, defect 0.5%, metamateri 0.5%, coupl 0.4%, devic 0.4%, two 0.4%, field 0.4%, time 0.4%, low.frequenc 0.4%, drive 0.4%
Focuses on the resonant frequencies of various excited particles.

Cluster 243: (265) model 54.4%, data 2.0%, system 1.0%, model.model 0.9%, simul 0.8%, paramet 0.6%, dynam 0.5%, test 0.4%, new 0.4%, languag 0.4%, qsar 0.4%, new.model 0.4%, uml 0.3%, gener 0.3%, inform 0.3%, fit 0.3%, construct 0.3%, set 0.3%, mathemat 0.3%, experiment 0.3%, structur 0.3%, statist 0.3%, time 0.3%, comfa 0.2%, predict 0.2%
Focuses on data aquisition and system modeling.

Cluster 244: (150) china 11.1%, pollen 4.2%, speci 2.8%, new 2.0%, genu 1.7%, fossil 1.5%, morpholog 1.3%, stamen 1.3%, provinc 1.2%, cirri 1.1%, pollin 1.1%, genera 1.0%, taxa 1.0%, flower 0.9%, ventral 0.9%, type 0.9%, earli 0.8%, ornament 0.8%, var 0.8%, corolla 0.8%, kineti 0.7%, male 0.7%, femal 0.7%, scienc 0.7%, pollen.grain 0.6%
Focuses on plant species.

Cluster 245: (154) activ 10.5%, inhibit 9.1%, induc 3.9%, antioxid 3.1%, oocyt 2.6%, inhibitor 2.6%, stimul 1.2%, cell 1.1%, concentr 1.1%, no 1.0%, glucos 0.9%, oxid 0.8%, depend 0.7%, ach 0.7%, platelet 0.6%, dose 0.6%, mumol 0.6%, scaveng 0.6%, inhibitori 0.6%, vitro 0.6%, cultur 0.5%, manner 0.5%, melatonin 0.5%, depend.manner 0.5%, h2o2 0.5%
Focuses on various chemicals or molecules/compounds that have an effect on the body (activation or inhibition) or the body's reaction to various stimuli.

Cluster 246: (136) ion 6.6%, absorpt 6.6%, laser 6.4%, optic 4.2%, spectra 2.5%, raman 2.4%, implant 2.2%, peak 1.8%, waveguid 1.8%, surfac 1.4%, irradi 1.3%, electron 1.3%, spectrum 1.2%, infrar 1.1%, refract 0.9%, sampl 0.8%, scatter 0.8%, anneal 0.7%, temperatur 0.7%, refract.index 0.6%, plasma 0.6%, reson 0.6%, beam 0.6%, energi 0.6%, ion.implant 0.6%
Focuses on the spectra of various molecules and how the spectra was obtained, especially ion absorption and laser optics

Cluster 247: (105) co2 7.4%, concentr 5.4%, fruit 5.1%, cultur 3.7%, sludg 3.5%, growth 1.7%, product 1.2%, rate 1.1%, compost 1.0%, control 1.0%, water 0.8%, cultiv 0.7%, sucros 0.7%, dai 0.7%, inocul 0.6%, co2.concentr 0.6%, fresh 0.6%, aerat 0.6%, condit 0.6%, cordycep 0.6%, batch 0.6%, higher 0.5%, dry 0.5%, level 0.5%, glucos 0.5%
Focuses on the preservation of fruits after harvest and its relation to the concentration of co2 in the controlled environment.

Cluster 248: (138) water 16.0%, solut 5.4%, membran 4.2%, solvent 2.8%, concentr 2.4%, aqueou 2.0%, enthalpi 1.7%, molar 1.5%, acid 1.4%, ionic 1.2%, solubl 1.1%, mixtur 1.1%, aqueou.solut 1.0%, anion 0.9%, mol 0.9%, h2o 0.8%, interact 0.7%, molar.volum 0.7%, rang 0.6%, ion 0.6%, standard 0.5%, standard.molar 0.4%, temperatur 0.4%, releas 0.4%, dilut 0.4%
Focuses on water, and various chemical reactions/solutions that involve/contain water. Also talks about membranes, and the properties of solutions containing water.

Cluster 249: (201) phase 22.3%, liquid 4.0%, temperatur 2.9%, transit 2.7%, diffus 2.2%, phase.transit 2.1%, solid 1.9%, diagram 1.1%, phase.diagram 1.0%, simul 0.9%, system 0.9%, structur 0.7%, phase.region 0.7%, atom 0.7%, interfac 0.7%, molecular.dynam 0.7%, crystal 0.7%, molecular.dynam.simul 0.7%, energi 0.7%, growth 0.6%, dynam.simul 0.6%, concentr 0.5%, densiti 0.5%, state 0.5%, properti 0.5%
Focuses on the different phases of materials as well as the effect that phase change has on the material.

Cluster 250: (161) acid 18.7%, concentr 7.4%, degrad 4.1%, rate 1.7%, remov 1.6%, metal 1.5%, solut 1.1%, kinet 1.1%, oxid 1.0%, product 1.0%, radic 1.0%, dye 0.9%, initi 0.9%, wastewat 0.8%, h2o2 0.7%, humic 0.6%, reaction 0.6%, ion 0.6%, organ 0.6%, chlorin 0.5%, amino 0.5%, increas 0.5%, rate.constant 0.5%, amino.acid 0.4%, decreas 0.4%
Focuses on acids and their uses, as well as the degradation of various compounds, either by acids or using other means.

Cluster 251: (177) simul 7.3%, fluid 2.9%, scale 2.6%, critic 2.5%, dynam 2.3%, model 2.0%, carlo 1.7%, mont 1.7%, motion 1.6%, mont.carlo 1.6%, theori 1.6%, forc 1.3%, distribut 1.1%, potenti 1.0%, densiti 0.9%, expon 0.9%, function 0.9%, direct 0.8%, eo 0.8%, state 0.7%, fluctuat 0.6%, paramet 0.6%, probabl 0.6%, univers 0.6%, two 0.6%
Focuses on simulations, especially of fluid dynamical systems.

Cluster 252: (230) optim 16.0%, set 3.6%, comput 3.5%, function 2.4%, constraint 2.3%, point 2.2%, converg 1.8%, gener 1.6%, linear 1.5%, convex 1.4%, program 1.4%, inequ 1.2%, iter 1.1%, new 1.0%, design 0.9%, data 0.7%, minim 0.7%, variabl 0.7%, object 0.7%, class 0.6%, mesh 0.6%, space 0.6%, random 0.6%, approxim 0.6%, scheme 0.6%
Focuses on computer optimization of data sets, along with optimization functions.

Cluster 253: (246) system 18.7%, oper 3.7%, softwar 2.9%, time 1.8%, reliabl 1.5%, test 1.5%, model 1.4%, data 1.3%, simul 1.2%, machin 1.2%, monitor 1.1%, tool 1.0%, inform 0.9%, environ 0.9%, integr 0.9%, fault 0.9%, applic 0.8%, real 0.8%, new 0.6%, power 0.6%, virtual 0.6%, comput 0.6%, control 0.6%, real.time 0.6%, visual 0.6%
Focuses on systems, with minor emphasis on operating systems and software.

Cluster 254: (308) temperatur 33.0%, thermal 1.8%, high.temperatur 1.5%, high 1.4%, degreesc 1.0%, surfac 0.9%, room 0.8%, room.temperatur 0.8%, increas 0.7%, decreas 0.7%, combust 0.7%, concentr 0.7%, low 0.7%, composit 0.6%, pressur 0.6%, rang 0.6%, conduct 0.6%, temperatur.rang 0.6%, rate 0.5%, melt 0.5%, densiti 0.5%, temperatur.depend 0.5%, fuel 0.5%, oxid 0.5%, coeffici 0.5%
Focuses on temperature and associated phenomena.

Cluster 255: (258) model 16.3%, paramet 2.9%, analyt 2.8%, numer 2.2%, coeffici 1.7%, veloc 1.6%, simul 1.0%, equat 0.9%, experiment 0.9%, diffus 0.9%, data 0.8%, measur 0.8%, system 0.7%, two 0.7%, energi 0.5%, linear 0.5%, solut 0.5%, correl 0.5%, experiment.data 0.5%, curv 0.5%, instabl 0.5%, three 0.4%, mean 0.4%, time 0.4%, function 0.4%
Focuses on models, especially their parametric analyses.

Appendix 4 – Cluto Taxonomy (SCI 256 2005)
-Science Citation Index
-256 Clusters
-2005 Data

The following flat taxonomy can be generated from the Level 4 categories of Figure 6. The bullets under each category represent the 256 elemental cluster themes. The parentheses contain the number of records associated with the bullet (cluster).

1. Physical and Engineering Sciences

1.1. chemical reactions, chemistry

1.1.1. the structure of molecules, crystal structure (1813)

1.1.1.1. atomic bonds and the crystal structure of molecules (1297)

- Cluster 169: (243) bond 16.2%, hydrogen.bond 13.8%, hydrogen 12.9%, molecul 4.5%, anion 4.2%, cation 2.6%, interact 1.9%, compound 1.6%, water 1.6%, titl 1.5%, water.molecul 1.3%, dimension 1.1%, structur 1.1%, titl.compound 1.1%, chain 1.0%, h2o 0.9%, form 0.8%, bond.interact 0.7%, hydrogen.bond.interact 0.6%, three.dimension 0.6%, atom 0.6%, link 0.6%, two 0.5%, center 0.5%, crystal 0.5% *Focuses on the bonds between atoms and molecules, specifically hydrogen bonding, and atom interaction.*
- Cluster 50: (144) titl.compound 15.3%, titl 13.2%, compound 9.5%, intermolecular 5.4%, bond 5.1%, molecul 5.0%, hydrogen 4.5%, hydrogen.bond 3.2%, intermolecular.hydrogen 2.8%, crystal 1.8%, crystal.structur 1.5%, intermolecular.hydrogen.bond 1.3%, intramolecular 1.2%, interact 1.1%, intramolecular.hydrogen 1.0% *Focuses on compounds containing intramolecular hydrogen bonds, with emphasis on their structure.*
- Cluster 32: (78) ring 31.3%, titl 5.9%, titl.compound 5.8%, dihedr.angl 4.0%, dihedr 4.0%, compound 3.6%, benzen.ring 2.8%, conform 2.1%, molecul 1.9%, angl 1.8%, benzen 1.8%, boat 1.3%, bond 1.1% *Focuses on compounds and molecules containing rings, such as benzene rings, with emphasis on their synthesis and characterization.*
- Cluster 38: (255) atom 22.4%, ligand 5.4%, titl 5.0%, two.atom 3.8%, coordin 2.9%, atom.two 2.6%, two 2.4%, distort 2.3%, geometri 2.2%, titl.compound 2.1%, molecul 2.0%, octahedr 1.6%, h2o 1.2%, bond 1.2%, compound 1.1%, water.molecul 1.0%, distort.octahedr 1.0%, complex 1.0%, carboxyl 1.0% *Focuses on the atomic structure of molecules and compounds.*
- Cluster 134: (109) atom 43.7%, oxygen.atom 3.6%, nitrogen.atom 2.5%, oxygen 1.8%, ligand 1.5%, nitrogen 1.4%, complex 1.2%, coordin 1.2%, two 1.2%, distort 1.0%, structur 0.9%, ion 0.8%, bridg 0.7%, two.oxygen 0.7%, two.oxygen.atom 0.7%, atom.two 0.7%, tin 0.6%, tin.atom 0.6%, geometri 0.6%, crystal 0.5%, site

0.5%, on 0.5%, molecul 0.4%, atom.on 0.3%, bipyramid 0.3% *Focuses on atomic structure concentrating on O2 and N2 atoms, with emphasis on ligands and synthesis of complexes.*

- Cluster 200: (202) h2o 14.1%, ligand 8.7%, coordin 6.3%, bridg 4.1%, complex 3.2%, coordin.polym 2.9%, chain 2.5%, polym 2.1%, ion 2.0%, clo4 1.7%, structur 1.6%, no3 1.3%, center 1.3%, dimension 1.1%, magnet 1.1%, synthes 1.1%, compound 1.0%, bi 0.9%, two 0.9%, bipi 0.7%, anion 0.6%, pyridyl 0.6%, interact 0.5%, crystal 0.5%, phen 0.5% *Focuses on chemistry with emphasis on chemical mechanics.*
- Cluster 205: (266) complex 44.7%, ligand 5.8%, phen 1.9%, iii 1.5%, coordin 1.0%, metal 1.0%, ion 0.9%, eta 0.9%, synthes 0.9%, phenanthrolin 0.7%, structur 0.7%, dna 0.7%, bi 0.7%, bpy 0.6%, spectra 0.6%, bind 0.5%, lanthanid 0.5%, copper 0.5%, two 0.5%, nmr 0.4%, luminesc 0.4%, bridg 0.4%, atom 0.4%, reaction 0.4%, fluoresc 0.3% *Focuses on various metal complexes and chemical properties of materials, with emphasis on ligands.*

1.1.1.2. the crystal orientation of molecules/atoms/ visualization (516)

- Cluster 136: (116) crystal 8.4%, singl.crystal 7.7%, rai 6.0%, singl.crystal.rai 6.0%, crystal.rai 5.8%, diffract 5.2%, crystal.rai.diffract 3.9%, singl 3.0%, structur 2.9%, compound 2.8%, rai.diffract 2.5%, synthes 2.1%, hydrotherm 1.4%, crystal.structur 1.1%, h2o 1.0%, angstrom 0.9%, hpo3 0.8%, complex 0.8%, bpy 0.7%, element 0.7%, nmr 0.6%, structur.singl.crystal 0.6%, structur.singl 0.5%, new 0.5%, framework 0.5% *Focuses on single crystal x-ray diffraction method for analyzing compounds and their structure.*
- Cluster 70: (171) crystal 9.8%, space.group 7.6%, space 3.7%, angstrom 3.4%, degre 3.0%, group 2.9%, beta 2.5%, monoclin 2.4%, complex 2.3%, system.space.group 2.1%, system.space 2.1%, compound 1.8%, structur 1.7%, 000 1.6%, singl.crystal 1.5%, rai 1.4%, crystal.structur 1.4%, diffract.crystal 1.3%, diffract 1.0% *Focuses on the characterization of crystal structures, especially space groups.*
- Cluster 17: (229) angstrom 62.1%, degre 3.5%, crystal 2.1%, beta 2.0%, angstrom.beta 1.9%, monoclin 1.7%, space.group 1.6%, ref 1.5% *Focuses on crystallographic structures and space groups, especially determination of unit cell dimensions: (designated as a, b, and c) in angstroms.*

1.1.2. chemical reactions, liquid chromatography (4028)

1.1.2.1. catalytic reactions (2270)

- Cluster 94: (145) isol 10.6%, compound 9.5%, spectroscop 6.8%, elucid 5.6%, structur.elucid 5.3%, nmr 4.4%, new 4.0%, structur 2.2%, two.new 1.7%, elucid.basi 1.3%, basi 1.2%, elucid.spectroscop 1.2%, new.compound 1.2%, diterpenoid 1.2%, hydroxi 1.1%, name 1.1%, structur.elucid.spectroscop 1.1%, spectral 1.0% *Focuses on isolation of compounds and elucidation of their structures.*
- Cluster 18: (59) beta 22.9%, glucopyranosyl 8.1%, beta.glucopyranosyl 7.5%, glucopyranosid 7.4%, beta.glucopyranosid 5.1%, isol 3.6%, glycosid 1.9%, compound 1.5%, spectroscop 1.5%, hydroxi 1.3%, new 1.3%, elucid 1.3%, alpha 1.3%, beta.glucopyranosyl.beta 1.2%, glucopyranosyl.beta 1.2%, glucosid 1.2%, structur.elucid 1.1% *Focuses on glucopyranosyl, especially isolation of chemical compounds containing glucopyranosyl.*
- Cluster 113: (98) beta 43.3%, cyclodextrin 9.8%, alpha 2.8%, beta.cyclodextrin 2.8%, inclus 2.3%, complex 1.4%, inclus.complex 1.4%, benzoyl 1.0%, acid 1.0%, nmr 0.8%, glcp 0.8%, beta.beta 0.7%, bind 0.7%, acetyl 0.6%, alpha.beta 0.5%, trichloroacetimid 0.5%, cyclodextrin.beta 0.4%, guest 0.4%, residu 0.4%, beta.glcp 0.4%, beta.cyclodextrin.beta 0.4%, benzoyl.beta 0.4%, caviti 0.3%, cd 0.3%, bi.beta 0.3% *Focuses on alpha and beta cyclodextrin.*
- Cluster 226: (92) molecular 14.2%, molecular.weight 6.4%, weight 5.2%, degrad 2.7%, fraction 2.5%, group 1.4%, polysaccharid 1.2%, averag.molecular 1.2%, nmr 1.0%, acid 0.9%, molecular.recognit 0.9%, chain 0.9%, solubl 0.7%, water 0.6%, lignin 0.6%, crosslink 0.6%, recognit 0.6%, structur 0.5%, averag.molecular.weight 0.5%, oil 0.5%, averag 0.5%, residu 0.5%, biodegrad 0.4%, eta 0.4%, synthes 0.4% *Focuses on the characteristics of various molecules, such as molecular weight, degradation of the molecules, etc.*
- Cluster 225: (107) nmr 15.7%, acid 10.8%, synthes 2.6%, methyl 2.1%, spectra 1.8%, compound 1.3%, calix 1.3%, carboxyl.acid 1.2%, deriv 1.2%, carboxyl 1.2%, structur 1.1%, amino 1.1%, nmr.nmr 1.1%, spectroscopi 1.0%, aren 0.9%, ester 0.8%, recognit 0.8%, chemic 0.7%, nmr.spectra 0.7%, calix.aren 0.6%, macrocycl 0.6%, spirobenzopyran 0.6%, methyl.ester 0.6%, fluoresc 0.6%, element 0.6% *Focuses on the structure and characteristics of various molecules, mainly using NMR mass spectrometry.*
- Cluster 207: (130) compound 35.7%, activ 3.2%, synthes 2.6%, nmr 2.3%, methyl 2.0%, substitut 1.7%, deriv.synthes 1.3%, new.compound 1.2%, structur 1.1%, spectra 1.0%, nmr.spectra 1.0%, element 0.9%, deriv 0.9%, herbicid 0.8%, seri 0.8%, target.compound 0.8%, compound.nmr 0.7%, new 0.7%, acid 0.6%, group 0.6%, structur.activ 0.6%, bioassai 0.5%,

spectra.element 0.5%, nmr.spectra.element 0.5%, biolog 0.4% *Focuses on various chemical compounds and their synthesis.*

- Cluster 91: (70) kinet 18.5%, reaction 8.4%, decomposit 2.5%, hydrolysi 2.3%, activ 2.2%, kinet.model 1.8%, rate 1.6%, kinet.paramet 1.6%, activ.energi 1.5%, enthalpi 1.2%, rate.constant 1.2%, mol 1.1%, paramet 1.1%, constant 1.0% *Focuses on kinetics of reactions.*
- Cluster 236: (165) reaction 44.8%, product 4.0%, condit 0.9%, reaction.temperatur 0.8%, solvent 0.8%, oxid 0.7%, temperatur 0.7%, reaction.rate 0.6%, catalyz 0.6%, mechan 0.5%, ga 0.5%, yield 0.5%, methanol 0.5%, reaction.mechan 0.5%, intermedi 0.5%, reaction.condit 0.4%, rate 0.4%, polymer 0.4%, reactor 0.4%, reaction.time 0.3%, radic 0.3%, ratio 0.3%, synthesi 0.3%, supercrit 0.3%, chain 0.3% *Focuses on various chemical reactions, and the product of those reactions and the conditions needed for the reaction, more specifically reaction temperature.*
- Cluster 235: (155) synthesi 12.3%, reaction 6.4%, alkyl 3.5%, synthes 3.4%, compound 2.8%, step 2.5%, substitut 2.4%, methyl 1.2%, total.synthesi 1.1%, yield 1.1%, cycliz 1.1%, kei 1.0%, wittig 0.9%, ether 0.9%, alpha 0.8%, on 0.8%, product 0.8%, synthet 0.8%, kei.step 0.7%, reduct 0.7%, deriv 0.7%, pot 0.6%, nmr 0.6%, on.pot 0.6%, regioselect 0.6% *Focuses on synthesis of chemicals and chemical reactions.*
- Cluster 227: (195) yield 23.9%, reaction 8.9%, afford 4.3%, mild 1.8%, acid 1.8%, alpha 1.7%, high.yield 1.6%, react 1.6%, product 1.5%, substitut 1.4%, correspond 1.0%, catalyt 1.0%, condit 0.9%, amin 0.9%, ester 0.8%, compound 0.8%, mild.condit 0.7%, catalyz 0.6%, reagent 0.6%, thf 0.6%, moder 0.6%, stereoselect 0.6%, high 0.6%, moder.yield 0.6%, alcohol 0.5% *Focuses on various chemical reactions and specifically on their yields.*
- Cluster 105: (126) aryl 21.6%, catalyz 8.0%, reaction 5.5%, palladium 5.0%, alkyn 3.8%, coupl 3.6%, palladium.catalyz 3.6%, coupl.reaction 3.4%, yield 3.2%, cross.coupl 2.1%, stereoselect 2.0%, afford 1.3%, regioselect 1.1%, suzuki 1.1%, synthesi 0.9%, substitut 0.9%, aryl.halid 0.8%, termin.alkyn 0.7%, halid 0.7%, phosphin 0.7%, cross 0.7%, cross.coupl.reaction 0.7%, sonogashira 0.5%, termin 0.4%, iodid 0.4% *Focuses on chemical reactions with an emphasis on catalyzing agents.*
- Cluster 109: (120) chiral 21.4%, enantioselect 11.8%, asymmetr 9.5%, allyl 3.9%, ligand 3.5%, keton 3.2%, reaction 2.4%, aldehyd 2.1%, yield 1.5%, synthesi 1.4%, alcohol 1.3%, catalyz 1.2%, catalyt 1.1%, addit 0.7%, catalyz.asymmetr 0.5%, asymmetr.addit 0.5%, aromat 0.5%, deriv 0.5%, beta 0.4%, oxazolin 0.4%, catalyt.asymmetr 0.4%, new.chiral 0.3%, catalyst 0.3%, absolut.configur 0.3%, unsatur 0.3% *Focuses on chiral compounds, chiral ligands and enantioselectivity.*

- Cluster 71: (78) aldehyd 30.2%, aromat.aldehyd 7.0%, aromat 5.6%, keton 3.6%, yield 3.1%, condens 2.2%, reaction 2.2%, solvent.free 1.5%, aldehyd.keton 1.4%, synthesi 1.2% *Focuses on aldehydes, especially aromatic aldehydes, with emphasis on reactions involving them.*
- Cluster 9: (50) ionic.liquid 26.6%, ionic 17.9%, liquid 9.7%, bmim 5.8%, liquid.bmim 2.3%, ionic.liquid.bmim 2.3%, reaction 1.9%, bf4 1.7%, methylimidazolium 1.3%, yield 1.1%, butyl.methylimidazolium 1.0%, pf6 1.0% *Focuses on ionic liquids, especially BMIM: (butyl methylimidazolium), with emphasis on its use as a reaction medium and promoter to increase reaction yields.*
- Cluster 179: (177) catalyst 41.5%, reaction 3.3%, catalyt 2.6%, polymer 1.8%, activ 1.4%, yield 1.2%, complex 1.0%, reus 0.8%, ionic.liquid 0.8%, ethylen 0.7%, epoxid 0.7%, copolymer 0.6%, liquid 0.6%, acid 0.6%, catalyz 0.6%, aldehyd 0.6%, carbon 0.5%, catalyst.system 0.5%, ionic 0.5%, polyethylen 0.5%, alcohol 0.5%, oxid 0.5%, palladium 0.5%, condit 0.4%, temperatur 0.4% *Focuses on catalysts and their use.*
- Cluster 114: (338) catalyst 53.8%, catalyt 2.8%, activ 2.5%, oxid 2.2%, select 1.5%, al2o3 1.4%, hydrogen 1.3%, support 1.2%, reaction 1.1%, methan 1.0%, convers 1.0%, methanol 0.7%, sio2 0.6%, al2o3.catalyst 0.5%, gamma.al2o3 0.5%, reduct 0.5%, oxygen 0.5%, promot 0.5%, surfac 0.5%, impregn 0.4%, carbon 0.4%, catalyt.activ 0.4%, temperatur 0.4%, zro2 0.4%, speci 0.4% *Focuses on chemical reactions, specifically those involving catalysts.*
- Cluster 33: (56) mcm 38.9%, molecular.siev 6.2%, siev 5.5%, mesopor 4.4%, catalyst 4.1%, sapo 3.5%, acid 1.6%, molecular 1.5%, select 1.3%, catalyt 1.2% *Focuses on molecular sieves, especially those comprised of MCMs: (mesoporous crystalline materials), with emphasis on their synthesis and characterization.*
- Cluster 194: (109) zeolit 24.7%, catalyt 10.4%, activ 4.4%, oxid 3.4%, zsm 1.9%, acid.site 1.7%, acid 1.7%, catalyt.activ 1.6%, catalyst 1.6%, site 1.3%, select 1.0%, reaction 0.9%, hzsm 0.8%, methanol 0.8%, cobalt 0.8%, tpd 0.7%, oxygen 0.7%, co2 0.7%, zeolit.beta 0.6%, adsorpt 0.5%, hydrogen 0.5%, reactor 0.5%, membran 0.4%, base 0.4%, complex 0.4% *Focuses on zeolites and their formation and chemical makeup, as well as various catalysts.*

1.1.2.2. adsorption of chemicals, and analysis of chemicals by liquid chromatography (1758)

- Cluster 122: (181) adsorpt 60.1%, adsorb 6.2%, adsorpt.capac 1.8%, surfac 1.5%, capac 1.2%, resin 1.1%, isotherm 1.0%, acid 0.5%, remov 0.5%, ion 0.5%, adsorpt.isotherm 0.4%, water 0.4%, langmuir 0.4%, carbon 0.4%, exchang 0.4%, solut 0.3%, activ.carbon 0.3%, zeolit 0.3%, metal 0.3%, soil 0.3%, concentr

0.3%, activ 0.2%, chitosan 0.2%, group 0.2%, mol 0.2% *Focuses on adsorption and removal of matter from various media using various adsorption media.*

- Cluster 139: (112) surfact 30.5%, micel 7.1%, vesicl 3.2%, sd 2.9%, sodium 2.4%, ctab 2.0%, concentr 2.0%, cmc 1.5%, anion 1.2%, water 1.0%, oil 0.9%, anion.surfact 0.9%, mix 0.9%, interact 0.9%, triton 0.8%, triton.100 0.8%, aggreg 0.8%, cation 0.7%, tension 0.7%, biodegrad 0.7%, hydrophob 0.6%, micellar 0.6%, solubil 0.6%, microemuls 0.5%, solut 0.5% *Focuses on surfactants and micelles and their aggregates.*
- Cluster 248: (138) water 16.0%, solut 5.4%, membran 4.2%, solvent 2.8%, concentr 2.4%, aqueou 2.0%, enthalpi 1.7%, molar 1.5%, acid 1.4%, ionic 1.2%, solubl 1.1%, mixtur 1.1%, aqueou.solut 1.0%, anion 0.9%, mol 0.9%, h2o 0.8%, interact 0.7%, molar.volum 0.7%, rang 0.6%, ion 0.6%, standard 0.5%, standard.molar 0.4%, temperatur 0.4%, releas 0.4%, dilut 0.4% *Focuses on water, and various chemical reactions/solutions that involve/contain water. Also talks about membranes, and the properties of solutions containing water.*
- Cluster 250: (161) acid 18.7%, concentr 7.4%, degrad 4.1%, rate 1.7%, remov 1.6%, metal 1.5%, solut 1.1%, kinet 1.1%, oxid 1.0%, product 1.0%, radic 1.0%, dye 0.9%, initi 0.9%, wastewat 0.8%, h2o2 0.7%, humic 0.6%, reaction 0.6%, ion 0.6%, organ 0.6%, chlorin 0.5%, amino 0.5%, increas 0.5%, rate.constant 0.5%, amino.acid 0.4%, decreas 0.4% *Focuses on acids and their uses, as well as the degradation of various compounds, either by acids or using other means.*
- Cluster 247: (105) co2 7.4%, concentr 5.4%, fruit 5.1%, cultur 3.7%, sludg 3.5%, growth 1.7%, product 1.2%, rate 1.1%, compost 1.0%, control 1.0%, water 0.8%, cultiv 0.7%, sucros 0.7%, dai 0.7%, inocul 0.6%, co2.concentr 0.6%, fresh 0.6%, aerat 0.6%, condit 0.6%, cordycep 0.6%, batch 0.6%, higher 0.5%, dry 0.5%, level 0.5%, glucos 0.5% *Focuses on the preservation of fruits after harvest and its relation to the concentration of co2 in the controlled environment.*
- Cluster 54: (76) gold 17.8%, sam 8.7%, electrod 5.7%, assembl 3.0%, self.assembl 2.8%, monolay 2.7%, immunosensor 2.6%, surfac 2.2%, gold.nanoparticl 2.1%, electrochem 1.9%, gold.electrod 1.7%, assembl.monolay 1.7%, self.assembl.monolay 1.7%, nanoparticl 1.6%, self 1.5%, immobil 1.3%, antibodi 1.1% *Focuses on devices containing or utilizing gold, with emphasis on electrodes, especially self-assembled monolayers: (SAMs), and biosensors.*
- Cluster 144: (138) electrod 39.1%, electrochem 3.3%, carbon 2.9%, oxid 2.0%, current 1.3%, biosensor 1.1%, glucos 1.0%, carbon.electrod 0.9%, potenti 0.9%, peak 0.8%, surfac 0.8%,

platinum 0.8%, mwnt 0.8%, detect 0.8%, voltammetri 0.6%, cnt 0.6%, gce 0.6%, cyclic 0.6%, mol 0.6%, amperometr 0.6%, glassi.carbon 0.5%, peak.current 0.5%, electrocatalyt 0.5%, glassi.carbon.electrod 0.5%, detect.limit 0.5% *Focuses on electrodes in electrochemical systems, especially carbon-based electrodes.*

- Cluster 213: (161) mol 17.7%, electrod 7.1%, detect.limit 2.5%, detect 2.3%, peak 2.0%, ion 1.9%, rang 1.8%, limit 1.7%, absorpt 1.5%, complex 1.4%, linear 1.2%, iii 1.2%, concentr 1.1%, rang.mol 1.0%, detect.limit.mol 1.0%, limit.mol 1.0%, sensit 0.9%, solut 0.8%, buffer 0.8%, reaction 0.8%, select 0.8%, buffer.solut 0.7%, acid 0.6%, voltammetri 0.6%, mol.detect.limit 0.6% *Focuses on molecular detection, as well as electrode fabrication and use.*
- Cluster 157: (138) chemiluminesc 5.2%, detect.limit 4.7%, mug 3.7%, sampl 3.6%, detect 3.1%, rel.standard 3.0%, limit 2.9%, rel.standard.deviat 2.8%, standard 2.7%, standard.deviat 2.5%, deviat 2.0%, trace 1.9%, inject 1.7%, flow.inject 1.6%, rsd 1.6%, formaldehyd 1.5%, flow 1.4%, recoveri 1.3%, linear.rang 1.3%, preconcentr 1.3%, rel 1.2%, selenium 1.1%, rang 1.1%, reaction 0.8%, digest 0.7% *Focuses on chemiluminescence, emphasizing issues of detection limit for detecting trace material amounts, especially at the microgram level of concentration.*
- Cluster 64: (82) capillari 11.6%, separ 8.3%, buffer 5.3%, electrophoresi 3.8%, detect 3.3%, mmol 3.2%, capillari.electrophoresi 2.3%, analyt 2.1%, acid 1.5%, chiral 1.3%, run.buffer 1.3%, voltag 1.2%, concentr 1.1%, electrokinet 1.0%, run 1.0% *Focuses on chemical separation methods, especially those based on capillary electrophoresis: (CE).*
- Cluster 107: (131) column 9.1%, mobil.phase 7.0%, separ 5.8%, phase 4.5%, mobil 4.1%, chromatograph 2.6%, acid 2.0%, hplc 1.9%, stationari.phase 1.9%, detect 1.9%, high.liquid 1.8%, liquid 1.7%, chromatographi 1.6%, methanol 1.5%, min 1.4%, chiral 1.4%, stationari 1.3%, csp 1.3%, revers.phase 1.1%, liquid.chromatographi 1.0%, acetonitril 0.9%, high.liquid.chromatographi 0.8%, flow.rate 0.7%, mug 0.7%, recoveri 0.7% *Focuses on different means of either charge or mass separation, high pressure liquid chromatography, or liquid-liquid extraction*
- Cluster 123: (102) mass 8.9%, spectrometri 7.8%, mass.spectrometri 7.3%, chromatographi 4.3%, ioniz 4.2%, ion 3.0%, esi 2.9%, electrosprai 2.5%, liquid.chromatographi 2.4%, liquid 2.3%, electrosprai.ioniz 1.5%, fragment 1.2%, tandem.mass 1.1%, tandem 1.0%, hplc 0.9%, high.liquid 0.9%, extract 0.8%, high.liquid.chromatographi 0.8%, separ 0.8%, chromatographi.mass 0.7%, chromatographi.mass.spectrometri 0.7%, ga.chromatographi 0.7%, ga 0.7%, tandem.mass.spectrometri 0.6%, ioniz.mass 0.6% *Focuses on mass spectrometry and liquid chromatography.*

- Cluster 97: (84) chromatographi 11.5%, enzym 3.5%, purifi 3.1%, hsccc 2.8%, ethyl.acet 2.6%, acet 2.5%, purif 2.3%, ethyl 1.7%, crude 1.3%, puriti 1.3%, extract 1.2%, counter.current.chromatographi 1.2%, current.chromatographi 1.2%, counter.current 1.2%, gel 1.2%, prepar 1.1%, high.speed.counter 1.1%, speed.counter 1.1%, speed.counter.current 1.1%, solvent.system 1.0%, separ 1.0% *Focuses on compounds and enzymes, with emphasis on their synthesis, separation, and purification, and especially the use of chromatography.*
- Cluster 128: (149) extract 51.8%, spme 3.0%, acid 1.9%, solvent 1.9%, sampl 1.2%, solid.phase 1.1%, liquid 1.1%, phase 1.0%, phase.microextract 0.9%, microextract 0.9%, solid 0.8%, chromatographi 0.7%, hplc 0.6%, extract.effici 0.5%, solid.phase.microextract 0.5%, ga.chromatographi 0.4%, water 0.4%, detect 0.4%, extract.time 0.4%, organ 0.4%, headspac 0.3%, sfe 0.3%, compound 0.3%, ga 0.3%, volatil 0.3% *Focuses on the extraction and recovery of one physical component from another physical component.*

1.2. thin films and mechanical properties of materials

1.2.1. the structural and mechanical properties of materials (8056)

1.2.1.1. nanomaterial structure, structural visualization (2830)

- Cluster 188: (123) polym 33.7%, solvent 3.4%, monom 2.5%, solubl 2.2%, poli 1.7%, imprint 1.4%, membran 1.3%, polymer 1.1%, synthes 1.1%, chain 1.0%, nmr 1.0%, organ.solvent 0.9%, polycondens 0.8%, acid 0.8%, imprint.polym 0.7%, ether 0.7%, polyimid 0.7%, molecular 0.6%, hyperbranch 0.6%, organ 0.5%, chromophor 0.5%, templat 0.5%, weight 0.4%, thermal 0.4%, properti 0.4% *Focuses on polymers, their formulation, their formation, and their uses.*
- Cluster 117: (112) polymer 32.5%, graft 6.0%, monom 5.1%, initi 2.6%, polym 2.1%, acryl 1.6%, molecular.weight 1.3%, raft 1.2%, methacryl 1.2%, radic.polymer 1.1%, radic 1.1%, mma 1.0%, weight 1.0%, atrp 0.9%, copolymer 0.9%, methyl 0.8%, poli 0.8%, styren 0.7%, copolym 0.7%, molecular 0.6%, vinyl 0.6%, convers 0.6%, transfer 0.6%, atom.transfer 0.5%, transfer.radic.polymer 0.5% *Focuses on various polymers, copolymers, monomers, and grafting.*
- Cluster 73: (111) copolym 40.7%, poli 6.3%, block 3.9%, block.copolym 2.7%, polymer 1.8% *Focuses on polymers, especially block copolymers, with emphasis on their synthesis.*
- Cluster 190: (132) crystal 17.3%, melt 4.9%, differenti.scan 3.2%, differenti.scan.calorimetri 2.9%, scan.calorimetri 2.9%, calorimetri 2.8%, dsc 2.6%, scan 1.8%, temperatur 1.7%, crystallin 1.6%, differenti 1.5%, phase 1.5%, thermal 1.1%, scan.calorimetri.dsc

1.1%, calorimetri.dsc 1.1%, polym 1.1%, copolym 0.8%, pcl 0.7%, isotherm 0.7%, crosslink 0.7%, poli 0.7%, ipp 0.6%, waxd 0.5%, cholester 0.5%, isotherm.crystal 0.5% *Focuses on the crystal structures of various compounds and their physical properties such as melting properties with the analysis done by differential scanning calorimetry.*

- Cluster 137: (124) blend 39.9%, hdpe 4.2%, mechan.properti 1.6%, melt 1.6%, crystal 1.1%, starch 1.1%, lldpe 1.1%, graft 1.1%, properti 1.0%, polyethylen 0.9%, mechan 0.8%, peo 0.7%, phase 0.7%, tensil 0.7%, shear 0.7%, temperatur 0.6%, strength 0.6%, morpholog 0.6%, densiti.polyethylen 0.6%, content 0.6%, epdm 0.6%, ldpe 0.6%, vibrat 0.5%, nylon 0.5%, copolym 0.5% *Focuses on blends, especially of polymers, with emphasis on high density polyethylene as well as mechanical and melt properties.*
- Cluster 65: (59) cure 24.3%, resin 16.1%, epoxi 5.0%, flame.retard 4.7%, retard 3.6%, flame 3.5%, thermal 2.1%, epoxi.resin 1.5%, thermal.degrad 1.1%, degrad 1.1% *Focuses on curing and resins, with emphasis on curing of resins.*
- Cluster 26: (69) nanocomposit 36.4%, clai 8.9%, mmt 7.1%, ommt 4.6%, montmorillonit 4.0%, intercal 2.5%, exfoli 2.1%, clai.nanocomposit 1.2% *Focuses on synthesis of nanocomposites, particularly polymer/clay nanocomposites containing montmorillonite: (MMT).*
- Cluster 2: (50) cnt 66.1%, nanotub 4.3%, carbon.nanotub 3.6%, carbon 3.2%, nanotub.cnt 3.1%, carbon.nanotub.cnt 3.0% *Focuses on carbon nanontubes, especially their synthesis and structure*
- Cluster 21: (125) nanotub 59.2%, carbon.nanotub 14.8%, carbon 9.1% *Focuses on nanotubes, especially synthesis of carbon nanotubes.*
- Cluster 52: (91) mwnt 13.3%, swnt 12.9%, carbon 11.4%, nanotub 8.6%, carbon.nanotub 6.7%, wall.carbon 5.2%, wall.carbon.nanotub 4.8%, wall 3.2%, singl.wall.carbon 2.0%, singl.wall 2.0%, mwcnt 1.3%, tube 1.3% *Focuses on single-wall and multi-wall carbon nanotubes; includes studies that focus on their synthesis, characterization, and use in reactions involving other materials.*
- Cluster 31: (166) nanowir 68.2%, arrai 2.1%, nanowir.arrai 1.6%, diamet 1.6% *Focuses on nanowires, especially their synthesis and characterization.*
- Cluster 11: (67) zno 62.2%, nanorod 5.1%, zno.nanorod 3.4%, zno.nanostructur 3.0%, nanostructur 2.3%, zinc 1.1% *Focuses on ZnO, especially ZnO nanorods, with emphasis on their synthesis and structure*
- Cluster 111: (80) nanorod 37.0%, nanobelt 8.5%, nanostructur 3.0%, synthes 1.7%, growth 1.6%, length 1.6%, singl.crystallin 1.3%, hydrotherm 1.2%, singl 1.1%, crystallin 1.1%, diamet 1.0%, crystal 0.9%, templat 0.7%, format 0.7%, mum 0.7%, surfact 0.5%,

nanorod.synthes 0.5%, step 0.5%, singl.crystal 0.5%, mechan 0.5%, growth.mechan 0.5%, morpholog 0.4%, oxid.nanorod 0.4%, xrd 0.3%, structur 0.3% *Focuses on nanostructures, especially nanorods and nanobelts, and their formation and characteristics*

- Cluster 132: (231) electron.microscopi 7.9%, microscopi 6.9%, transmiss.electron 6.4%, transmiss.electron.microscopi 6.3%, electron 6.2%, transmiss 5.0%, diffract 3.2%, rai 3.2%, electron.microscopi.tem 2.8%, microscopi.tem 2.8%, tem 2.8%, diffract.xrd 1.6%, xrd 1.3%, rai.diffract 1.3%, powder 1.1%, rai.diffract.xrd 1.0%, synthes 0.8%, xrd.transmiss.electron 0.8%, diffract.xrd.transmiss 0.7%, xrd.transmiss 0.7%, nanorod 0.7%, rai.powder 0.7%, rai.powder.diffract 0.6%, powder.diffract 0.6%, morpholog 0.6% *Focuses on electron microscopy, especially transmission electron microscopy: (tem).*
- Cluster 80: (157) nanoparticl 64.5%, gold 2.4%, gold.nanoparticl 1.4%, size 1.4% *Focuses on nanoparticles, especially those containing gold.*
- Cluster 181: (79) colloid 8.4%, silver 7.9%, assembl 5.1%, hollow 4.9%, nanoparticl 4.2%, self.assembl 2.4%, sphere 1.8%, templat 1.7%, shell 1.7%, silica 1.6%, particl 1.5%, self 1.4%, nanospher 1.2%, surfac 1.2%, colloid.crystal 1.0%, silver.nanoparticl 0.9%, aggreg 0.8%, poli 0.8%, diamet 0.8%, hollow.sphere 0.8%, nanopl 0.8%, layer 0.7%, spheric 0.7%, crystal 0.7%, ctab 0.6% *Focuses on colloidal silver spheres and their self assembly.*
- Cluster 234: (113) mesopor 6.0%, silica 4.0%, electron 3.2%, surfac 3.1%, microscopi 2.6%, morpholog 2.2%, templat 2.2%, electron.microscopi 1.7%, mesopor.silica 1.7%, membran 1.7%, scan 1.6%, pore 1.4%, transmiss.electron 1.4%, transmiss 1.3%, surfact 1.0%, diamet 1.0%, scan.electron 0.9%, aerogel 0.8%, spectroscopi 0.8%, synthes 0.8%, rai 0.7%, sem 0.7%, structur 0.7%, crystal 0.6%, transmiss.electron.microscopi 0.6% *Focuses on mesoporous silicas.*
- Cluster 233: (136) pore 7.9%, materi 7.0%, scaffold 6.7%, dentin 3.9%, porou 3.8%, adhes 2.7%, cement 1.8%, membran 1.8%, poros 1.7%, strength 1.6%, ldh 1.4%, surfac 1.4%, pore.size 1.0%, hap 1.0%, etch 1.0%, sem 0.9%, calcium 0.8%, composit 0.8%, water 0.8%, bone 0.7%, foam 0.7%, chitosan 0.7%, structur 0.6%, size 0.6%, properti 0.5% *Focuses on the separation of materials, pore sizes in filter media and the structure of the filter media itself.*
- Cluster 211: (100) suspens 5.5%, nano 5.3%, surfac.area 4.9%, dispers 4.6%, surfac 3.7%, slurri 3.3%, calcin 2.4%, zirconia 2.4%, area 2.3%, zro2 1.9%, al2o3 1.9%, powder 1.5%, alumina 1.4%, aqueou 1.3%, solid 1.2%, aln 1.2%, stabil 1.1%, size 1.0%, particl 0.8%, viscos 0.8%, high.surfac.area 0.8%, oxid 0.7%, high.surfac 0.7%, solid.load 0.6%, bet 0.6% *Focuses on various*

suspensions, and the nanoparticles in them. Also talks about powders and the particles' surface area.

- Cluster 193: (176) powder 34.8%, size 3.3%, particl 2.9%, precursor 1.7%, particl.size 1.5%, combust 1.5%, calcin 1.5%, temperatur 1.4%, xrd 1.3%, phase 1.1%, synthes 1.0%, precipit 0.8%, nano 0.7%, gel 0.7%, synthesi 0.7%, tem 0.7%, powder.synthes 0.6%, mill 0.5%, product 0.5%, sem 0.5%, nanos 0.5%, la2o3 0.5%, rai 0.5%, oxid 0.4%, sol 0.4% *Focuses on powders and their fabrication and synthesis and mechanical properties.*
- Cluster 208: (267) particl 50.6%, size 6.9%, particl.size 5.8%, size.distribut 1.0%, composit 0.9%, dispers 0.8%, distribut 0.8%, surfac 0.8%, nano 0.5%, nanoparticl 0.5%, silica 0.4%, temperatur 0.4%, concentr 0.4%, particl.size.distribut 0.3%, spheric 0.3%, fine 0.3%, increas 0.3%, water 0.2%, content 0.2%, morpholog 0.2%, phase 0.2%, nano.particl 0.2%, polymer 0.2%, diamet 0.2%, precipit 0.2% *Focuses on particulate matter of varying types, and its size and size distribution.*
- Cluster 206: (88) shell 10.2%, particl 8.4%, caco3 5.1%, core 5.0%, microspher 4.1%, sio2 2.8%, dust 2.1%, nano 1.9%, core.shell 1.8%, polymer 1.5%, composit 1.5%, surfac 1.3%, emuls 1.3%, graft 1.1%, size 0.9%, concentr 0.8%, monodispers 0.8%, dispers 0.6%, sphere 0.6%, polystyren 0.6%, magnetit 0.6%, floc 0.6%, composit.particl 0.5%, calcium 0.5%, silica 0.5% *Focuses on shells and encapsulating various compounds within them.*
- Cluster 68: (174) tio2 54.3%, photocatalyt 6.3%, anatas 2.2%, photocatalyst 1.7%, photocatalyt.activ 1.6%, sol 1.3%, dope 1.0%, gel 1.0% *Focuses on TiO2, especially its photocatalytic behavior.*

1.2.1.2. alloys, alloy composition, composition/structure (5226)

- Cluster 229: (129) pressur 24.6%, high.pressur 4.1%, miner 3.5%, hydrat 3.5%, ga 3.1%, gpa 3.0%, oxygen 2.6%, temperatur 1.7%, ga.hydrat 1.1%, iron 1.0%, high 1.0%, water 0.7%, phase 0.6%, quartz 0.6%, content 0.5%, rock 0.5%, plagioclas 0.5%, fluid 0.5%, zone 0.5%, transit 0.4%, pressur.gpa 0.4%, nanocryst 0.4%, resist 0.4%, format 0.4%, silic 0.4% *Focuses on pressure and high pressure. Sometimes discusses chemical reactions or geologic phenomina.*
- Cluster 254: (308) temperatur 33.0%, thermal 1.8%, high.temperatur 1.5%, high 1.4%, degreesc 1.0%, surfac 0.9%, room 0.8%, room.temperatur 0.8%, increas 0.7%, decreas 0.7%, combust 0.7%, concentr 0.7%, low 0.7%, composit 0.6%, pressur 0.6%, rang 0.6%, conduct 0.6%, temperatur.rang 0.6%, rate 0.5%, melt 0.5%, densiti 0.5%, temperatur.depend 0.5%, fuel 0.5%, oxid 0.5%, coeffici 0.5% *Focuses on temperature and associated phenomena.*

- Cluster 249: (201) phase 22.3%, liquid 4.0%, temperatur 2.9%, transit 2.7%, diffus 2.2%, phase.transit 2.1%, solid 1.9%, diagram 1.1%, phase.diagram 1.0%, simul 0.9%, system 0.9%, structur 0.7%, phase.region 0.7%, atom 0.7%, interfac 0.7%, molecular.dynam 0.7%, crystal 0.7%, molecular.dynam.simul 0.7%, energi 0.7%, growth 0.6%, dynam.simul 0.6%, concentr 0.5%, densiti 0.5%, state 0.5%, properti 0.5% *Focuses on the different phases of materials as well as the effect that phase change has on the material.*
- Cluster 195: (153) temperatur 6.9%, spin 5.8%, magnet 5.7%, ferromagnet 5.1%, dope 4.8%, field 3.4%, transit 2.9%, magnetoresist 2.4%, resist 1.9%, sampl 1.4%, insul 1.3%, phase 1.3%, electr 1.3%, superconduct 1.3%, temperatur.depend 1.0%, state 0.9%, depend 0.9%, antiferromagnet 0.8%, metal 0.8%, electron 0.7%, transport 0.7%, electr.field 0.7%, paramagnet 0.6%, ion 0.6%, la0 0.6% *Focuses on the magnetic properties of materials along with feromagnets, as well as the doping of various materials to make them magnetic.*
- Cluster 131: (228) magnet 58.2%, magnet.field 5.8%, field 5.1%, magnet.properti 1.7%, temperatur 1.5%, coerciv 0.7%, anisotropi 0.7%, phase 0.7%, properti 0.6%, grain 0.4%, sampl 0.3%, ribbon 0.3%, ferrit 0.3%, structur 0.3%, coupl 0.3%, magnet.measur 0.2%, particl 0.2%, materi 0.2%, ferromagnet 0.2%, measur 0.2%, transit 0.2%, electr 0.2%, exchang.coupl 0.2%, magnetostrict 0.2%, compound 0.2% *Focuses on magnetic properties of various materials, the effects of magnetization on various materials.*
- Cluster 239: (195) field 23.5%, magnet 17.5%, magnet.field 5.8%, current 1.8%, electr 1.6%, model 1.1%, flux 1.1%, electromagnet 0.9%, ground 0.8%, reconnect 0.7%, electr.field 0.6%, ht 0.5%, geomagnet 0.5%, numer 0.5%, cme 0.4%, densiti 0.4%, forc 0.4%, power 0.4%, dipol 0.4%, plasma 0.3%, acceler 0.3%, two 0.3%, levit 0.3%, system 0.3%, magnet.flux 0.3% *Focuses on magnets and magnetic fields.*
- Cluster 147: (102) turbul 29.6%, flow 7.0%, vortex 3.9%, vortic 3.2%, veloc 2.3%, reynold 1.8%, fire 1.6%, model 1.6%, pressur 1.5%, bubbl 1.3%, particl 1.2%, simul 1.1%, number 0.9%, reynold.number 0.7%, wall 0.7%, combust 0.7%, flame 0.6%, eddi 0.6%, turbul.flow 0.6%, scale 0.6%, vent 0.5%, street 0.5%, turbul.model 0.5%, numer 0.5%, fluctuat 0.4% *Focuses on turbulent flow, especially vortex dynamics and modeling.*
- Cluster 210: (223) flow 43.5%, veloc 2.9%, fluid 2.5%, model 2.1%, jet 1.8%, ga 1.5%, pressur 1.2%, bubbl 0.9%, bed 0.9%, simul 0.8%, flow.rate 0.8%, channel 0.7%, particl 0.7%, liquid 0.6%, nozzl 0.6%, numer 0.6%, convect 0.5%, experiment 0.5%, flow.field 0.5%, field 0.5%, flow.pattern 0.5%, rate 0.5%, wall

0.4%, paramet 0.4%, air 0.4% *Focuses on flow dynamics and fluid flow modeling.*

- Cluster 115: (106) heat 36.8%, heat.transfer 8.9%, transfer 6.0%, fin 1.9%, heat.flux 1.7%, flux 1.6%, cycl 1.4%, convect 1.2%, refriger 1.1%, temperatur 0.9%, model 0.9%, exergi 0.8%, cool 0.8%, flow 0.7%, mass.transfer 0.7%, heat.exchang 0.6%, compressor 0.5%, heat.pump 0.4%, irrevers 0.4%, coeffici 0.4%, experiment 0.4%, transfer.coeffici 0.4%, tube 0.3%, mass 0.3%, power 0.3% *Focuses on heat transfer.*
- Cluster 217: (140) heat 35.7%, temperatur 4.4%, heat.transfer 4.1%, thermal 2.7%, transfer 2.6%, tube 1.9%, cool 1.8%, refriger 1.3%, water 0.9%, boil 0.8%, heat.capac 0.8%, conduct 0.7%, thermal.conduct 0.7%, capac 0.6%, heat.treatment 0.5%, moistur 0.5%, phase 0.5%, experiment 0.5%, liquid 0.5%, surfac 0.4%, evapor 0.4%, condens 0.4%, degreesc 0.4%, treatment 0.3%, ga 0.3% *Focuses on heat transfer mechanics and applications, as well as heat transfer experiments.*
- Cluster 82: (60) cool 8.7%, air 8.3%, heat 6.8%, rvr 5.8%, build 4.1%, energi.consumpt 3.8%, energi 3.6%, heat.cool 3.4%, ventil 3.3%, consumpt 2.6%, citi 2.0%, indoor 1.3%, energi.effici 1.2% *Focuses on air cooling and heating systems, especially their energy consumption and efficiency.*
- Cluster 20: (116) crack 58.6%, stress 3.4%, intens.factor 2.2%, crack.tip 1.9%, tip 1.5%, stress.intens 1.2%, stress.intens.factor 1.2%, fractur 1.0%, load 1.0% *Focuses on cracking, crack tip growth rates, and stress intensity factors of materials.*
- Cluster 160: (119) stress 50.0%, shear 5.4%, rock 2.4%, residu.stress 1.6%, residu 1.1%, deform 0.9%, plastic 0.8%, strain 0.8%, fractur 0.7%, shear.stress 0.7%, model 0.7%, compress 0.5%, mine 0.4%, element 0.4%, strength 0.4%, stress.field 0.4%, stress.state 0.3%, simul 0.3%, materi 0.3%, load 0.3%, specimen 0.3%, failur 0.3%, tension 0.3%, yield 0.3%, concret 0.3% *Focuses on the mechanical properties of materials, and stresses on them, along with what happens to stressed materials. Also talks about residual stresses, and stress testing and stresses in rocks.*
- Cluster 163: (149) strain 22.0%, damag 8.1%, plastic 5.9%, stress 5.3%, deform 3.2%, model 2.9%, strain.rate 2.2%, fatigu 2.0%, stress.strain 1.8%, constitut 1.8%, materi 1.8%, load 1.3%, constitut.model 1.0%, solder 0.9%, rate 0.8%, test 0.7%, plastic.strain 0.7%, harden 0.7%, simul 0.7%, dynam 0.6%, compress 0.5%, concret 0.5%, shear 0.4%, failur 0.4%, finit.element 0.4% *Focuses on mechanical properties of materials with emphasis on damage to the material, plastic deformation and fatigue life.*
- Cluster 88: (100) deform 22.5%, strain 9.2%, strain.rate 5.4%, roll 5.0%, stress 2.1%, microstructur 2.0%, compress 1.8%, superplast

1.8%, tensil 1.6%, cold.roll 1.5%, alloi 1.4%, rate 1.3%, temperatur 1.2%, textur 1.1%, hot 1.1%, grain 1.1%, cold 1.0%, recrystal 1.0%, plastic 1.0% *Focuses on the deformation behavior of materials as determined through experimental investigations.*

- Cluster 237: (173) load 12.8%, beam 3.3%, buckl 2.9%, lamin 2.6%, bend 2.5%, forc 2.3%, deform 1.9%, plate 1.7%, dynam 1.6%, elast 1.6%, axial 1.4%, model 1.4%, displac 1.2%, wall 1.2%, vibrat 1.1%, section 1.0%, curv 1.0%, stiff 1.0%, column 0.9%, indent 0.8%, numer 0.8%, cut 0.7%, test 0.7%, plastic 0.7%, stiffen 0.7% *Focuses on the loading of structural members along with their mechanical properties and the failure modes of various beams, laminates and other materials.*
- Cluster 186: (128) finit.element 15.5%, element 12.7%, finit 10.5%, model 2.5%, roll 2.5%, element.model 1.7%, finit.element.model 1.6%, simul 1.6%, rail 1.3%, fem 1.2%, dam 0.8%, strip 0.8%, forc 0.8%, stress 0.8%, contact 0.7%, rotor 0.6%, calcul 0.6%, deform 0.6%, materi 0.6%, numer 0.6%, plate 0.6%, bridg 0.5%, elast 0.5%, field 0.5%, shape 0.5% *Focuses on finite element models.*
- Cluster 12: (67) martensit 21.6%, transform 9.6%, martensit.transform 8.4%, alloi 8.2%, shape.memori 5.7%, memori 4.1%, shape.memori.alloi 2.9%, memori.alloi 2.9%, transform.temperatur 2.8%, temperatur 2.8%, shape 1.9%, sma 1.4%, martensit.transform.temperatur 1.3%, phase 1.1%, phase.transform 1.1%, tini 1.0% *Focuses on martensitic transformation temperatures, particularly of shape memory alloys*
- Cluster 44: (62) glass 50.0%, bmg 3.4%, metal.glass 2.2%, glass.transit 1.7%, bulk.metal 1.4%, bulk.metal.glass 1.4%, crystal 1.2%, nucleat 1.0% *Focus on glasses, especially metallic glasses, with emphasis on synthesis and characterization of properties such as glass transition temperature.*
- Cluster 43: (89) alloi 32.7%, amorph 15.3%, amorph.alloi 7.3%, magnet 5.3%, glass 3.2%, glass.form 2.2%, crystal 1.3% *Focuses on characterization of alloys, especially amorphous alloys, with emphasis on high temperature and magnetic properties.*
- Cluster 24: (87) alloi 35.0%, hydrogen 6.7%, hydrogen.storag 4.1%, capac 3.5%, discharg 3.3%, electrochem 2.6%, mill 2.5%, storag 2.3%, discharg.capac 1.8%, hydrid 1.7%, phase 1.7%, storag.alloi 1.1%, hydrogen.storag.alloi 1.1%, cycl 1.0% *Focuses on alloy synthesis and electrochemical characterization, with emphasis on characterization of hydrogen storage and discharge capacity.*
- Cluster 182: (353) alloi 56.8%, microstructur 2.4%, phase 1.5%, cast 1.4%, oxid 1.1%, temperatur 0.9%, strength 0.7%, precipit 0.6%, layer 0.5%, grain 0.5%, properti 0.4%, gamma 0.4%, surfac 0.4%, content 0.4%, ag 0.4%, addit 0.4%, eutect 0.3%, magnesium.alloi 0.3%, melt 0.3%, mechan 0.3%, magnesium 0.3%, rate 0.3%, form

0.3%, titanium 0.3%, mechan.properti 0.3% *Focuses on the creation/formation/evaluation of alloys and their microstructure.*

- Cluster 74: (325) coat 68.6%, sprai 1.6%, oxid 1.3%, composit.coat 1.2%, composit 1.0% *Focuses on coatings, especially composite coatings.*
- Cluster 61: (147) wear 41.9%, friction 8.9%, wear.resist 3.0%, steel 2.7%, slide 2.2%, surfac 1.6%, lubric 1.6%, composit 1.6%, resist 1.6%, coat 1.1%, friction.coeffici 1.0% *Focuses on wear resistance of materials, especially experimental evaluation of wear resistance properties.*
- Cluster 231: (251) composit 36.1%, sic 3.8%, materi 2.3%, strength 2.1%, matrix 1.9%, fibr 1.5%, fractur 1.3%, properti 1.3%, reinforc 1.1%, mechan 0.9%, mechan.properti 0.8%, fabric 0.7%, particl 0.7%, carbon 0.7%, oxid 0.6%, powder 0.6%, al2o3 0.6%, fiber 0.6%, properti.composit 0.5%, interfac 0.5%, tough 0.5%, microstructur 0.4%, bend 0.4%, metal 0.4%, thermal 0.4% *Focuses on the composition, mechanical properties, and synthesis of various materials.*
- Cluster 149: (142) discharg 11.1%, capac 6.9%, cathod 6.7%, electrochem 6.4%, cycl 3.5%, electrolyt 3.5%, lithium 3.2%, batteri 2.6%, materi 2.4%, charg.discharg 2.2%, mah 2.0%, lifepo4 2.0%, charg 1.7%, composit 1.3%, oxid 1.2%, discharg.capac 1.1%, licoo2 1.1%, cathod.materi 1.0%, electrod 1.0%, lithium.ion 0.9%, polym.electrolyt 0.8%, ion 0.7%, spinel 0.5%, conduct 0.5%, powder 0.5% *Focuses on the charge and discharge capacity of various materials, and mainly their use in electrochemical/electrical charge transfers. Basically it focuses on batteries/battery cells.*
- Cluster 6: (33) solder 40.1%, undercool 12.1%, imc 4.1%, alloi 2.1%, solidif 1.9%, eutect 1.9%, dendrit 1.7%, solder.alloi 1.5%, solder.joint 1.5%, reflow 1.3%, interfac 1.1% *Focuses on solder and solder joints, particularly lead free solder, with emphasis on solidification, structure, and properties.*
- Cluster 77: (56) weld 36.0%, crack 7.4%, fatigu 3.6%, carbid 2.5%, joint 1.8%, fractur 1.7%, heat 1.4%, stress 1.3% *Focuses on the structure and properties of materials, with emphasis on characterization of welds and fatigue and fracture behavior.*
- Cluster 27: (55) corros 62.6%, steel 2.7%, corros.resist 1.7%, pit 1.5%, eros 1.3%, resist 1.3%, implant 1.1%, stainless.steel 1.1%, stainless 1.0% *Focuses on corrosion and pitting resistance of metals and alloys, including steels and stainless steels.*
- Cluster 112: (135) steel 38.7%, ferrit 6.3%, austenit 5.1%, grain 2.0%, roll 1.8%, martensit 1.7%, microstructur 1.2%, transform 1.0%, strength 1.0%, deform 0.9%, carbon 0.9%, precipit 0.8%, bainit 0.8%, temperatur 0.7%, low.carbon 0.6%, stainless.steel 0.6%, stainless 0.6%, hard 0.6%, disloc 0.5%, carbon.steel 0.5%, cool 0.4%, boundari 0.4%, low 0.4%, tough 0.4%, size 0.4%

Focuses on various steels, especially ferritic and austenitic, with an emphasis on failure modes, testing, and composition

- Cluster 103: (127) grain 46.9%, grain.size 4.7%, boundari 4.1%, grain.boundari 3.5%, size 2.2%, microstructur 1.5%, alloi 1.5%, deform 1.3%, refin 1.1%, grain.refin 0.7%, twin 0.7%, ribbon 0.7%, grain.growth 0.6%, recrystal 0.6%, phase 0.6%, temperatur 0.5%, ecap 0.4%, surfac 0.4%, anneal 0.4%, cast 0.3%, growth 0.3%, textur 0.3%, averag.grain 0.3%, plastic 0.3%, dendrit 0.3% *Focuses on the grain structure of various alloys and the microstructure of such alloys.*
- Cluster 126: (188) sinter 44.3%, powder 3.2%, sinter.temperatur 2.7%, grain 2.0%, ceram 2.0%, temperatur 1.7%, composit 1.4%, sp 1.3%, sampl 1.3%, plasma.sinter 1.1%, spark 1.0%, spark.plasma 0.9%, spark.plasma.sinter 0.9%, microstructur 0.8%, press 0.8%, properti 0.7%, phase 0.7%, sinter.sp 0.6%, densiti 0.6%, materi 0.6%, thermoelectr 0.5%, sic 0.4%, plasma.sinter.sp 0.4%, fabric 0.4%, size 0.4% *Focuses on various sintering techniques such as spark plasma sintering, and the mechanical properties of sintered materials as well as proper sintering techniques.*
- Cluster 140: (180) ceram 50.0%, zro2 2.4%, sinter 2.3%, glass.ceram 1.6%, composit 1.3%, strength 1.3%, glass 1.3%, fractur 1.2%, al2o3 1.0%, materi 0.8%, mechan.properti 0.8%, green 0.7%, microstructur 0.7%, gelcast 0.7%, properti 0.7%, green.bodi 0.7%, tough 0.6%, slurri 0.6%, temperatur 0.5%, fractur.tough 0.5%, mechan 0.5%, powder 0.5%, grind 0.4%, si3n4 0.4%, grain 0.4% *Focuses on ceramics, including fabrication, doping, and mechanical properties.*
- Cluster 46: (155) dielectr 33.1%, ceram 12.8%, dielectr.constant 6.5%, dielectr.properti 4.0%, sinter 3.3%, constant 3.0%, microwav 1.8%, temperatur 1.4%, microwav.dielectr 1.2%, properti 1.2% *Focuses on characterization of the dielectric properties of ceramics.*

1.2.2. thin films and optics (5910)

1.2.2.1. thin films, thin film deposition (1274)

- Cluster 62: (120) film 19.9%, thin.film 8.5%, thin 7.3%, ferroelectr 6.4%, dielectr 4.2%, bst 3.4%, pzt 3.3%, anneal 2.4%, temperatur 1.2%, deposit 1.1% *Focuses on films, especially thin films, with emphasis on their synthesis and evaluation.*
- Cluster 104: (351) film 31.3%, thin.film 22.0%, thin 19.1%, substrat 1.8%, deposit 1.5%, temperatur 0.7%, anneal 0.5%, sputter 0.5%, zno 0.4%, tio2 0.3%, optic 0.3%, electron 0.3%, orient 0.3%, layer 0.2%, film.deposit 0.2%, grown 0.2%, silicon 0.2%, structur 0.2%, sol 0.2%, surfac 0.2%, crystal 0.2%, resist 0.2%, magnetron 0.2%,

magnetron.sputter 0.2%, dope 0.2% *Focuses on thin films and their deposition.*

- Cluster 158: (445) film 64.8%, deposit 2.6%, substrat 1.4%, thick 1.0%, anneal 0.7%, surfac 0.5%, film.thick 0.5%, zno 0.5%, film.deposit 0.5%, temperatur 0.5%, properti 0.4%, sputter 0.4%, structur 0.3%, electron 0.3%, zno.film 0.3%, rai 0.3%, optic 0.3%, spectroscopi 0.2%, magnet 0.2%, amorph 0.2%, dlc 0.2%, carbon 0.2%, microscopi 0.2%, orient 0.2%, measur 0.2% *Focuses on various films, discussing formation, doping, deposition etc.*
- Cluster 39: (69) diamond 27.1%, deposit 13.4%, diamond.film 10.9%, film 9.4%, substrat 3.0%, cvd 1.4% *Focuses on diamond films, including nano-structured diamond films, with emphasis on their deposition by various methods.*
- Cluster 152: (128) film 35.5%, electrod 5.3%, multilay.film 3.1%, multilay 2.8%, tio2 2.1%, electrochem 1.5%, layer 1.3%, tio2.film 1.1%, biosensor 1.1%, assembl 0.9%, glucos 0.8%, layer.layer 0.7%, cyclic 0.7%, voltammetri 0.7%, film.electrod 0.5%, carbon 0.5%, deposit 0.5%, self.assembl 0.5%, cyclic.voltammetri 0.5%, surfac 0.5%, redox 0.4%, solut 0.4%, carbon.electrod 0.4%, mol 0.4%, oxid 0.4% *Focuses on films and doping agents that are embedded or placed on films, such as sensors.*
- Cluster 224: (161) film 33.3%, surfac 3.3%, composit.film 3.1%, polym 2.1%, monolay 1.9%, optic 1.3%, composit 1.1%, light 1.0%, langmuir 0.8%, polar 0.7%, shg 0.6%, water 0.6%, poli 0.6%, blodgett 0.6%, graft 0.5%, langmuir.blodgett 0.5%, grate 0.4%, fabric 0.4%, properti 0.4%, amphiphil 0.4%, subphas 0.4%, afm 0.3%, angl 0.3%, surfac.pressur 0.3%, pmma 0.3% *Focuses on films, specifically composite films and polymer films.*

1.2.2.2. structure and properties of thin films (thickness, density function, etc) and optics and physics (4636)

- Cluster 214: (204) layer 18.2%, film 8.5%, substrat 5.0%, thick 4.4%, deposit 2.8%, gan 2.8%, anneal 2.6%, aln 1.9%, silicon 1.7%, multilay 1.3%, buffer.layer 1.0%, surfac 0.9%, layer.thick 0.9%, temperatur 0.8%, sputter 0.8%, buffer 0.8%, grown 0.7%, zno 0.7%, epitaxi 0.6%, gan.film 0.6%, lcmo 0.5%, interfac 0.5%, growth 0.5%, nitrid 0.5%, tin 0.5% *Focuses on thin films and their substrates, and film deposition.*
- Cluster 222: (137) layer 9.0%, gan 6.8%, etch 3.8%, quantum 3.7%, quantum.dot 2.8%, dot 2.7%, gaa 2.2%, ina 2.0%, qd 1.7%, grown 1.3%, epitaxi 1.3%, electron 1.2%, algan 1.1%, implant 1.1%, photoluminesc 1.0%, silicon 1.0%, surfac 1.0%, sige 0.8%, fabric 0.8%, peak 0.6%, thick 0.6%, tunnel 0.6%, heterostructur 0.6%, molecular.beam.epitaxi 0.5%, beam.epitaxi 0.5% *Focuses on etched layers, usually of silicon, and includes quantum dots as well.*

- Cluster 56: (76) devic 12.7%, emit 6.2%, layer 5.9%, light.emit 4.0%, alq 3.7%, ito 3.3%, ol 3.1%, hole 2.8%, organ 2.7%, npb 2.3%, light 2.3%, organ.light 2.2%, organ.light.emit 2.0%, lumin 1.2%, emiss 1.2%, light.emit.devic 1.0%, emit.devic 1.0%, effici 1.0% *Focuses on devices, especially organic light emitting devices, including light emitting diodes: (LEDs), with emphasis on their fabrication.*
- Cluster 5: (57) black.hole 26.7%, black 21.2%, hole 16.2%, entropi 4.6%, horizon 3.1%, scalar 1.1%, quasinorm 1.0%, brick.wall 1.0% *Focuses on black holes and black hole event horizons, with emphasis on their associated entropy.*
- Cluster 124: (88) jet 10.6%, grb 5.6%, radio 4.5%, pulsar 4.3%, gamma.rai 3.6%, burst 2.9%, sourc 2.4%, rai 2.4%, emiss 2.2%, disk 2.0%, gamma 2.0%, line 1.6%, accret 1.6%, flare 1.5%, agn 1.5%, afterglow 1.3%, luminos 1.3%, compon 1.2%, gamma.rai.burst 1.1%, rai.burst 1.0%, galact 0.9%, similar 0.9%, model 0.8%, accret.disk 0.7%, light.curv 0.6% *Focuses on many different aspects of astronomy, including pulsars, gamma ray emission and luminosity.*
- Cluster 90: (76) star 30.9%, galaxi 10.3%, mass 2.9%, cluster 2.8%, stellar 2.6%, ngc 1.6%, outflow 1.5%, binari 1.3%, luminos 1.2%, circl.dot 1.1% *Focuses on stars, and their relation to composition and evolution of galaxies.*
- Cluster 204: (136) emiss 23.9%, luminesc 6.7%, photoluminesc 3.3%, excit 2.5%, dope 2.2%, peak 1.6%, band 1.5%, zno 1.5%, zn 1.5%, intens 1.5%, nanocryst 1.4%, spectra 1.3%, blue 1.2%, temperatur 1.1%, emiss.peak 0.8%, nanoparticl 0.7%, fluoresc 0.7%, spectrum 0.6%, cdte 0.6%, pbwo4 0.6%, size 0.5%, dy3 0.5%, exciton 0.5%, room 0.5%, sio2 0.5% *Focuses on the emission properties of materials, especially photoluminescence.*
- Cluster 28: (75) eu3 31.9%, phosphor 19.6%, emiss 3.5%, luminesc 3.3%, excit 2.4%, eu2 2.2%, dope 1.7%, eu3.ion 1.5%, ion 1.4% *Focuses on Europium ion: (Eu^{3+} and Eu^{2+}) doped phosphors, especially their synthesis and characterization, with emphasis on luminescent properties.*
- Cluster 35: (114) er3 13.1%, upconvers 8.8%, emiss 6.9%, glass 6.4%, yb3 5.4%, dope 3.6%, excit 2.2%, luminesc 1.7%, laser 1.5%, tm3 1.4%, absorpt 1.3%, crystal 1.2%, er3.dope 1.1%, fluoresc 1.1%, tellurit 1.1%, intens 1.0%, lifetim 1.0% *Focuses on glasses containing Er^{3+}, especially for upconversion laser applications.*
- Cluster 150: (126) fluoresc 41.5%, bind 4.0%, quench 2.9%, fluoresc.intens 2.4%, bsa 1.6%, hsa 1.5%, intens 1.3%, fluoresc.quench 0.9%, complex 0.9%, ion 0.8%, mol 0.7%, bind.constant 0.6%, emiss 0.6%, albumin 0.6%, dna 0.6%, spectra 0.6%, serum.albumin 0.5%, constant 0.5%, serum 0.5%,

fluoresc.spectra 0.4%, concentr 0.4%, protein 0.4%, interact 0.4%, detect 0.4%, sensit 0.4% *Focuses on the fluorescence of various materials/atoms/compounds and fluorescence quenching.*

- Cluster 230: (121) chitosan 12.5%, absorpt 4.9%, fluoresc 4.6%, photon 3.6%, radic 3.2%, two.photon 2.7%, aggreg 1.7%, spectra 1.7%, excit 1.5%, porphyrin 1.5%, state 1.2%, phenyl 1.1%, scaveng 1.1%, molecular 1.0%, two 0.7%, bi 0.7%, antioxid 0.7%, solvent 0.6%, group 0.6%, complex 0.6%, phthalocyanin 0.6%, excit.state 0.6%, emiss 0.6%, dye 0.6%, triplet 0.5% *Focuses on chitosan, and the separation of various molecules specifically by means of absorption.*
- Cluster 146: (82) photon 10.3%, atom 7.7%, field 6.6%, three.level 2.8%, coher 2.7%, level 2.6%, state 2.6%, caviti 2.4%, excit 2.1%, quantum 1.8%, level.atom 1.7%, two.photon 1.4%, detun 1.2%, two 1.1%, reson 0.9%, probe 0.9%, popul 0.9%, three.level.atom 0.8%, electromagnet.induc.transpar 0.8%, electromagnet.induc 0.8%, induc.transpar 0.7%, magnon 0.7%, mode 0.7%, absorpt 0.7%, caviti.field 0.6% *Focuses on photons: (emission/absorption/interaction) and multi-level atomic systems emphasizing the role of fields on the photon and atomic system behaviors.*
- Cluster 127: (152) puls 49.1%, laser 10.8%, laser.puls 3.7%, optic 1.4%, femtosecond 1.1%, gener 0.7%, plasma 0.6%, pump 0.5%, chirp 0.5%, phase 0.4%, durat 0.4%, power 0.4%, modul 0.3%, radiat 0.3%, frequenc 0.3%, nonlinear 0.3%, puls.durat 0.3%, intens 0.3%, ultrashort 0.3%, signal 0.3%, time 0.3%, harmon 0.3%, group.veloc 0.3%, field 0.3%, numer 0.3% *Focuses on pulses from optical lasers.*
- Cluster 130: (173) laser 30.6%, pump 15.4%, power 5.1%, output 3.0%, optic 1.7%, diod 1.6%, output.power 1.6%, caviti 1.3%, lock 1.1%, puls 1.0%, pump.power 0.8%, yag 0.8%, mode 0.8%, switch 0.8%, mode.lock 0.6%, laser.diod 0.6%, modul 0.4%, effici 0.4%, repetit 0.4%, frequenc 0.4%, intens 0.4%, signal 0.4%, satur 0.3%, beam 0.3%, rate 0.3% *Focuses on lasers and pumped lasers.*
- Cluster 121: (129) fiber 25.6%, wavelength 11.0%, optic 6.2%, gain 2.7%, pump 2.4%, laser 1.6%, puls 1.5%, power 1.5%, amplifi 1.4%, birefring 1.4%, dispers 1.1%, fibr 1.0%, polar 0.9%, erbium 0.9%, tunabl 0.8%, output 0.8%, pcf 0.7%, signal 0.7%, erbium.dope 0.6%, modul 0.6%, mode 0.6%, raman 0.6%, optic.fiber 0.5%, dope 0.5%, dope.fiber 0.4% *Focuses on fiber optics and the component fibers.*
- Cluster 45: (66) fiber 60.4%, concret 5.8%, strength 1.8%, reinforc 1.2% *Focuses on fibers, especially fibers for composites and concrete reinforcement, with emphasis on their syntheis and characterization.*
- Cluster 25: (66) grate 32.8%, fiber 8.6%, bragg 6.0%, bragg.grate 5.2%, fbg 5.1%, wavelength 4.0%, fiber.bragg.grate 3.3%,

fiber.bragg 3.3%, sensor 1.4% *Focuses on gratings, especially fiber Bragg gratings: (FBGs), with emphasis on their development as sensors and optical elements.*

- Cluster 125: (71) switch 20.0%, power 19.4%, voltag 5.4%, convert 4.0%, output 2.0%, diod 1.4%, oper 1.3%, devic 1.3%, current 1.2%, circuit 1.0%, optic 0.9%, power.factor 0.9%, optic.switch 0.9%, modul 0.8%, zv 0.7%, oper.principl 0.6%, mode 0.6%, rectifi 0.5%, control 0.4%, design 0.4%, power.consumpt 0.4%, input 0.3%, system 0.3%, oscil 0.3%, high 0.3% *Focuses on power, namely electrical power, as well as various switches and power converters.*
- Cluster 242: (174) frequenc 16.1%, mode 11.7%, reson 9.3%, nois 3.1%, reson.frequenc 1.6%, oscil 1.6%, acoust 0.9%, caviti 0.9%, band 0.9%, vibrat 0.9%, measur 0.7%, signal 0.7%, harmon 0.6%, nonlinear 0.6%, amplitud 0.5%, voltag 0.5%, defect 0.5%, metamateri 0.5%, coupl 0.4%, devic 0.4%, two 0.4%, field 0.4%, time 0.4%, low.frequenc 0.4%, drive 0.4% *Focuses on the resonant frequencies of various excited particles.*
- Cluster 22: (46) antenna 34.3%, microstrip 5.7%, bandwidth 5.6%, patch 3.0%, slot 2.5%, patch.antenna 2.1%, ebg 1.9%, band 1.7%, ground.plane 1.7%, radiat 1.6%, imped 1.3%, imped.bandwidth 1.2%, frequenc 1.1%, ground 1.0%, pbg 1.0% *Focuses on antennas, particularly patch antennas, with emphasis on their design and characterization.*
- Cluster 106: (77) waveguid 26.8%, fdtd 7.0%, differ.time.domain 2.3%, finit.differ 2.3%, time.domain 2.3%, differ.time 2.3%, finit.differ.time 2.1%, index 1.6%, optic 1.5%, finit 1.3%, domain 1.3%, differ 1.2%, domain.fdtd 1.0%, time.domain.fdtd 1.0%, coupl 1.0%, mode 0.9%, mmi 0.8%, multimod 0.8%, photon 0.7%, simul 0.7%, band 0.6%, propag 0.6%, caviti 0.6%, electromagnet 0.6%, numer 0.6% *Focuses on waveguides along with Finite Difference Time Domain analysis of the waveguides.*
- Cluster 174: (177) wave 52.3%, propag 2.0%, frequenc 1.8%, refract 1.3%, electromagnet.wave 1.0%, electromagnet 0.9%, neg.refract 0.8%, field 0.8%, numer 0.7%, spiral 0.6%, crystal 0.5%, mode 0.5%, dispers 0.5%, acoust 0.5%, photon.crystal 0.5%, harmon 0.4%, spiral.wave 0.4%, photon 0.4%, wave.propag 0.4%, amplitud 0.4%, dimension 0.4%, neg 0.4%, groov 0.3%, gap 0.3%, guid 0.3% *Focuses on electromagnetic, gravitational, and other waves, and their propagation.*
- Cluster 101: (147) beam 60.2%, gaussian 3.0%, gaussian.beam 1.7%, propag 1.3% *Focuses on beams, especially Gaussian beams.*
- Cluster 196: (91) optic 22.7%, soliton 11.0%, beam 3.0%, modul 2.1%, nonlinear 1.6%, america 1.5%, phase 1.4%, detector 1.3%, dark 1.1%, superresolut 1.0%, system 1.0%, photorefract 1.0%, intens 0.8%, light 0.7%, trap 0.7%, spatial.soliton 0.7%, filter

0.7%, theoret 0.7%, phase.shift 0.6%, spatial 0.6%, shift 0.6%, incoher 0.6%, numer 0.5%, apertur 0.5%, vortex 0.5% *Focuses on optics, both biological: (human eye) and mechanical: (optical crystals etc, with some emphasis on solitons).*

- Cluster 246: (136) ion 6.6%, absorpt 6.6%, laser 6.4%, optic 4.2%, spectra 2.5%, raman 2.4%, implant 2.2%, peak 1.8%, waveguid 1.8%, surfac 1.4%, irradi 1.3%, electron 1.3%, spectrum 1.2%, infrar 1.1%, refract 0.9%, sampl 0.8%, scatter 0.8%, anneal 0.7%, temperatur 0.7%, refract.index 0.6%, plasma 0.6%, reson 0.6%, beam 0.6%, energi 0.6%, ion.implant 0.6% *Focuses on the spectra of various molecules and how the spectra was obtained, especially ion absorption and laser optics*
- Cluster 192: (132) crystal 34.6%, grown 2.7%, optic 2.6%, linbo3 2.6%, defect 2.5%, pwo 1.8%, photon.crystal 1.8%, absorpt 1.7%, photon 1.6%, dope 1.6%, singl.crystal 1.2%, growth 1.2%, crystal.grown 1.2%, band 0.9%, singl 0.9%, pwo.crystal 0.8%, structur 0.8%, linbo3.crystal 0.7%, spectra 0.7%, caf2 0.5%, kdp 0.4%, face 0.4%, domain 0.3%, diffract 0.3%, trap 0.3% *Focuses on various crystals and their light carrying/ other optical properties, as well as defects in them.*
- Cluster 191: (83) band 14.4%, dope 9.1%, electron 6.2%, gap 3.3%, energi 2.4%, state 2.2%, electron.structur 1.8%, surfac 1.6%, band.gap 1.5%, densiti 1.3%, atom 1.3%, valenc 1.2%, orbit 1.2%, structur 1.1%, densiti.state 1.1%, valenc.band 1.0%, fermi 0.6%, photoemiss 0.6%, phonon 0.6%, semiconductor 0.6%, do 0.6%, gaa 0.5%, conduct 0.5%, band.structur 0.5%, calcul 0.5% *Focuses on doped materials, especially crystals and their various parameters that fall in different bands. Also emphasizes optical band gaps.*
- Cluster 223: (198) cluster 11.1%, molecul 3.9%, atom 3.9%, electron 3.4%, orbit 3.0%, densiti.function 2.9%, structur 2.8%, densiti 2.7%, molecular 2.5%, densiti.function.theori 2.2%, function.theori 2.2%, energi 2.0%, state 1.6%, calcul 1.2%, theori 1.2%, bond 1.2%, function 1.2%, dft 1.1%, charg 0.8%, electron.structur 0.7%, ground.state 0.7%, absorpt 0.6%, molecular.orbit 0.6%, compound 0.6%, ground 0.6% *Focuses on the structure of various molecules and atoms or clusters of atoms. Also discusses the orbit of electrons, and the density and structure based on density functional theory.*
- Cluster 168: (179) bond 7.3%, b3lyp 6.7%, energi 6.1%, isom 6.1%, 31g 2.5%, vibrat 1.9%, geometri 1.6%, densiti.function 1.5%, dft 1.3%, theori 1.2%, level 1.2%, b3lyp.31g 1.2%, hydrogen 1.2%, structur 1.2%, dissoci 1.2%, molecul 1.1%, atom 1.0%, basi.set 1.0%, densiti 0.9%, complex 0.9%, mp2 0.9%, densiti.function.theori 0.9%, function.theori 0.9%, electron 0.9%, stabl 0.8% *Focuses on the bonds between atoms and molecules, with emphasis on their electron transfer.*

- Cluster 85: (117) reaction 18.4%, transit.state 5.8%, energi 3.4%, b3lyp 2.7%, transit 2.0%, state 1.9%, 311 1.6%, mp2 1.5%, theori 1.3%, barrier 1.3%, calcul 1.2%, pathwai 1.2%, radic 1.2%, ch3 1.2%, product 1.1%, level 1.1%, energi.surfac 1.1%, potenti.energi 1.0%, potenti.energi.surfac 1.0% *Focuses on reactions, especially their energy and transition states.*
- Cluster 240: (142) energi 18.0%, state 5.1%, calcul 3.2%, potenti 2.0%, ground.state 1.9%, interact 1.8%, ground 1.7%, model 1.5%, theori 1.5%, orbit 1.4%, excit 1.0%, transit 1.0%, function 0.8%, pair 0.7%, electron 0.7%, potenti.energi 0.6%, system 0.6%, two 0.6%, paramet 0.6%, correl 0.5%, correct 0.5%, charg 0.5%, level 0.5%, experiment 0.5%, basi.set 0.5% *Focuses on the energy states of various charged particles.*
- Cluster 202: (128) state 25.8%, coupl 5.1%, synchron 3.5%, coher.state 3.1%, coher 2.4%, oscil 1.8%, wave 1.7%, vibrat 1.7%, squeez 1.5%, quantum 1.3%, phase 1.2%, ground 1.0%, transit 1.0%, mode 1.0%, energi 0.9%, system 0.9%, excit 0.7%, two 0.6%, spin 0.6%, trap 0.6%, band 0.6%, ground.state 0.5%, hamiltonian 0.5%, even.odd 0.5%, odd 0.5% *Focuses on the states of various systems, and their synchronization and coupling.*
- Cluster 199: (93) field 5.8%, spin 5.7%, dark 4.8%, theori 4.1%, dark.energi 4.0%, cosmolog 3.7%, univers 2.4%, energi 2.1%, field.theori 1.6%, inflat 1.6%, model 1.4%, matter 1.4%, gravit 1.3%, fermion 1.2%, scalar 1.2%, dark.matter 1.1%, constant 1.1%, cosmolog.constant 1.0%, cosmic 0.9%, scalar.field 0.9%, brane 0.9%, formula 0.8%, perturb 0.7%, paramet 0.7%, particl 0.7% *Focuses on various topics in astrophysics, and physics in general.*
- Cluster 172: (174) quantum 37.0%, spin 9.7%, quantum.dot 2.9%, dot 2.3%, phonon 1.8%, state 1.7%, coupl 1.7%, gate 1.4%, electron 1.1%, field 1.0%, qubit 1.0%, system 0.9%, current 0.9%, exciton 0.6%, gaa 0.5%, magnet 0.5%, classic 0.5%, energi 0.4%, decoher 0.4%, mesoscop 0.4%, charg 0.4%, reson 0.4%, two 0.4%, interact 0.3%, magnet.field 0.3% *Focuses on quantum particules, and quantum dots, and the spin of electrons.*
- Cluster 15: (111) entangl 58.8%, state 6.4%, entangl.state 4.3%, quantum 4.2%, scheme 1.3%, teleport 1.2% *Focuses on quantum entanglement and entanglement states.*
- Cluster 81: (168) decai 29.2%, bar 8.4%, psi 5.9%, branch 2.5%, branch.fraction 2.2%, gamma 2.2%, detector 2.0%, meson 1.4%, fraction 1.3%, measur 1.1%, violat 1.0%, x10 1.0% *Focuses on decays of subatomic particles, especially those involving branching fractions.*
- Cluster 37: (81) quark 48.8%, meson 5.8%, nucleon 3.4%, mass 3.3%, gluon 1.6%, chiral 1.4%, qcd 1.0% *Focuses on quarks and quark models.*

- Cluster 67: (67) gev 14.4%, collis 8.0%, pion 4.1%, hadron 3.5%, parton 3.1%, transvers 2.6%, momentum 2.3%, product 2.2%, collid 2.0%, transvers.momentum 1.9%, quark 1.6%, gluon 1.4%, bar 1.3%, lhc 1.3%, pseudorapid 1.2%, jet 1.0% *Focuses on energy levels in the GeV range; especially energies related to the motion and interaction of sub-atomic particles.*
- Cluster 84: (80) cross.section 14.1%, section 12.0%, cross 9.2%, scatter 3.8%, momentum 3.5%, isospin 2.7%, energi 2.7%, calcul 2.0%, differenti.cross 1.1%, differenti.cross.section 1.0%, neutron 1.0% *Focuses on cross sections, especially related to quantum reactions/interactions.*
- Cluster 119: (86) neutron 13.1%, proton 8.9%, nuclei 8.7%, band 3.4%, nucleon 2.5%, energi 2.1%, gamma 1.8%, relativist 1.6%, mev 1.4%, state 1.3%, nuclear 1.1%, detector 1.1%, calcul 1.1%, mean.field 1.1%, nucleu 1.0%, triaxial 1.0%, relativist.mean.field 1.0%, relativist.mean 1.0%, rmf 0.9%, odd 0.8%, deform 0.8%, superdeform 0.6%, model 0.6%, nuclear.matter 0.6%, moment.inertia 0.6% *Focuses on various experiments that probe the nucleus, emphasizing detection of protons and neutrons.*

2. life sciences and mathematics

2.1. mathematics, algorithm and program development, modeling (mathematical & algorithmic)

2.1.1. mathematics and differential equations (2333)

2.1.1.1. differential equations, equations of systems (1287)

- Cluster 183: (116) boundari 12.5%, equat 7.5%, solut 3.9%, boundari.condit 3.8%, numer 3.8%, integr 2.6%, integr.equat 2.3%, crack 1.9%, function 1.8%, condit 1.6%, singular 1.3%, stress 1.2%, displac 1.2%, domain 1.0%, wave 1.0%, accuraci 0.6%, quadratur 0.6%, differenti.quadratur 0.6%, deriv 0.6%, green.function 0.6%, point 0.6%, singular.integr 0.5%, singular.integr.equat 0.5%, piezoelectr 0.5%, orthotrop 0.5% *Focuses on mathematics: boundary conditions, equations, etc.*
- Cluster 185: (122) numer 8.0%, equat 6.9%, solut 4.5%, finit 3.4%, converg 3.0%, stoke 2.9%, scheme 2.8%, navier 2.6%, navier.stoke 2.5%, approxim 2.3%, finit.element 1.9%, stoke.equat 1.6%, element 1.6%, order 1.6%, navier.stoke.equat 1.6%, discret 1.5%, solv 0.8%, flow 0.7%, second.order 0.7%, linear 0.7%, interpol 0.7%, second 0.6%, accuraci 0.6%, error 0.6%, numer.solut 0.6% *Focuses on numerical equations, especially solution of numerical equations for fluid flows, such as the navier stokes equation.*
- Cluster 108: (97) equat 21.0%, differenti.equat 15.5%, differenti 11.8%, partial.differenti 3.7%, partial.differenti.equat 3.0%, stochast 2.5%, partial 2.0%, solut 1.3%, nonlinear 1.2%, numer 1.0%, viscoelast 0.9%, ordinari.differenti 0.9%, ordinari.differenti.equat

0.9%, ordinari 0.7%, stochast.differenti 0.6%, linear 0.6%, dynam 0.5%, gener 0.4%, govern 0.4%, stochast.differenti.equat 0.4%, system 0.4%, function 0.4%, deriv 0.3%, plate 0.3%, non 0.3% *Focuses on differential equations to describe various systems*

- Cluster 220: (225) equat 52.0%, solut 5.0%, wave 1.1%, nonlinear 0.9%, deriv 0.9%, linear 0.6%, system 0.6%, paramet 0.6%, schroding 0.5%, matrix 0.4%, schroding.equat 0.4%, matrix.equat 0.4%, theori 0.4%, potenti 0.4%, function 0.4%, space 0.4%, condit 0.4%, motion 0.4%, model 0.3%, boltzmann 0.3%, initi 0.3%, integr 0.3%, relat 0.3%, order 0.3%, term 0.3% *Focuses on mathematics, especially solution techniques for mathematical equations.*
- Cluster 55: (135) solut 17.7%, wave 9.0%, equat 8.4%, wave.solut 7.6%, exact 3.1%, nonlinear 3.0%, solitari 2.8%, ellipt 2.8%, solitari.wave 2.7%, ellipt.function 2.6%, exact.solut 2.1%, jacobi.ellipt 1.9%, jacobi 1.6%, solitari.wave.solut 1.6%, jacobi.ellipt.function 1.4%, function 1.3%, period 1.1% *Focuses on exact solutions, including solitary wave solutions, to various equations and functions.*
- Cluster 41: (101) soliton 37.1%, soliton.solut 7.9%, equat 5.4%, solut 5.3%, nonlinear 2.1%, dimension 1.7%, variabl.separ 1.3%, variabl 1.2%, perturb 1.0% *Focuses on solitons: (waves), especially equations and solutions related to them.*
- Cluster 99: (66) limit.cycl 11.6%, homoclin 7.8%, bifurc 5.4%, orbit 4.9%, cycl 4.1%, system 3.8%, limit 3.0%, oscil 2.4%, perturb 2.3%, period 2.2%, homoclin.orbit 1.9%, lyapunov.expon 1.5%, motion 1.4%, point 1.4%, chao 1.3%, lyapunov 1.2%, number.limit.cycl 1.2%, number.limit 1.2%, expon 1.0%, heteroclin 1.0% *Focuses on evaluations of systems, especially those involving limit cycles, homoclinic loops or orbits, and oscillation or oscillators.*
- Cluster 8: (72) bifurc 56.8%, hopf 7.0%, hopf.bifurc 5.4%, delai 2.1%, period 2.1%, period.solut 1.1% *Focuses on bifurcation, especially Hopf bifurcation.*
- Cluster 49: (113) period 12.1%, period.solut 10.8%, posit.period 4.2%, exist 3.9%, posit.period.solut 3.7%, delai 3.0%, solut 2.9%, predat 2.8%, prei 2.2%, equat 2.1%, impuls 1.8%, differenti.equat 1.7%, coincid.degre 1.5%, suffici.condit 1.5%, theorem 1.4%, suffici 1.4%, differenti 1.1%, posit 1.0%, exist.posit.period 1.0%, continu.theorem 1.0%, predat.prei 1.0%, stabil 1.0% *Focuses on positive periodic solutions to system equations.*
- Cluster 75: (118) exist 13.5%, posit.solut 6.9%, solut 6.8%, boundari 5.3%, point 4.7%, theorem 4.6%, fix.point 4.1%, equat 3.7%, point.theorem 2.7%, fix.point.theorem 2.6%, posit 2.4%, fix 2.1%, differenti.equat 1.7%, differenti 1.5%, exist.multipl 1.2%, singular 1.1%, nonlinear 1.1%, exist.posit 1.0%, infin 1.0%

Focuses on the existence of positive solutions to equations, especially those involving a fixed point theorem.

- Cluster 162: (122) solut 9.0%, global 8.1%, exist 5.4%, infin 4.6%, asymptot 3.8%, equat 3.6%, nonlinear 2.1%, suffici.condit 1.9%, system 1.8%, suffici 1.8%, condit 1.8%, blow 1.5%, posit 1.4%, prove 1.2%, uniqu 1.2%, attractor 1.2%, equal 1.0%, boundari 1.0%, global.exist 0.9%, cauchi 0.8%, differ.equat 0.8%, oscil 0.8%, exist.uniqu 0.8%, asymptot.behavior 0.7%, element.infin 0.7% *Focuses on mathematical equations and mathematical models and systems.*

2.1.1.2. algebraic equations and functions (1046)

- Cluster 98: (144) equal 30.2%, let 13.1%, equal.equal 5.0%, element 4.3%, integ 3.7%, infin 3.4%, sigma 2.7%, subset 1.6%, mod 1.4%, prove 1.3%, delta 1.2%, posit.integ 1.0%, equal.equal.equal 1.0% *Focuses on mathematical investigations, with emphasis on solutions to equations and functions.*
- Cluster 16: (83) graph 56.5%, vertic 7.7%, bar 3.2%, vertic.bar.vertic 2.0%, bar.vertic.bar 2.0%, bar.vertic 2.0%, edg 1.9%, vertex 1.4%, conjectur 1.2%, connect 1.0% *Focuses on graphs and curves, especially theories and proofs involving them*
- Cluster 72: (115) algebra 56.1%, lie 2.8%, lie.algebra 2.2%, modul 2.0%, loop.algebra 1.4%, hierarchi 1.4%, let 1.3% *Focuses on algebras, especially Lie algebra and loop algebra.*
- Cluster 19: (66) symmetri 14.5%, conserv 10.4%, invari 9.3%, lie 5.0%, lie.symmetri 4.1%, noether 3.8%, form.invari 3.6%, equat 3.0%, system 2.7%, infinitesim 2.4%, infinitesim.transform 2.3%, hojman 1.7%, noether.conserv 1.6%, non.noether 1.5%, conserv.law 1.5%, non.noether.conserv 1.2%, transform 1.1%, law 1.1% *Focuses on system symmetries, especially Lie symmetries and non-Noether conserved quantities.*
- Cluster 148: (99) theorem 49.9%, semigroup 2.9%, prove 2.7%, regular 2.3%, subgroup 2.0%, space 1.3%, finit 1.0%, finit.group 0.9%, convex 0.7%, congruenc 0.7%, condit 0.7%, group 0.6%, proof 0.6%, class 0.5%, set 0.5%, point 0.5%, oper 0.5%, order 0.5%, fan 0.4%, topolog 0.4%, prime 0.4%, theori 0.4%, limit.theorem 0.4%, maxim 0.4%, isomorph 0.4% *Focuses on mathematical theorems.*
- Cluster 175: (101) space 27.0%, manifold 10.4%, metric 4.3%, oper 2.8%, map 2.3%, riemannian 2.0%, banach 1.5%, compact 1.4%, invari 1.0%, bergman 1.0%, prove 1.0%, riemannian.manifold 1.0%, banach.space 0.9%, curvatur 0.9%, sphere 0.9%, theorem 0.7%, function 0.6%, isometr 0.6%, norm 0.6%, let 0.6%, hardi 0.6%, bloch 0.6%, sitter 0.5%, dimension 0.5%, local 0.5% *Focuses on mathematics, with emphases on spaces and manifolds.*

- Cluster 120: (78) matric 26.1%, matrix 13.6%, rank 3.4%, invers 3.3%, eigenvalu 3.2%, singular 3.1%, condit 1.4%, element 1.4%, condit.number 1.3%, nonsingular 1.2%, suffici.condit 1.1%, suffici 1.0%, bound 0.9%, multilinear 0.9%, oper 0.9%, commut 0.8%, represent 0.8%, number 0.7%, vandermond 0.7%, kernel 0.6%, displac.structur 0.5%, drazin 0.5%, space 0.5%, singular.integr 0.5%, integr 0.5% *Focuses on mathematics, with a strong emphasis on matrices.*
- Cluster 238: (130) function 11.7%, element 7.8%, inequ 6.7%, finit 4.2%, polynomi 3.3%, interpol 3.0%, formula 2.7%, set 1.7%, finit.element 1.3%, order 1.2%, class 1.1%, math 1.1%, bound 1.0%, ident 0.7%, sum 0.7%, asymptot 0.7%, proof 0.7%, converg 0.7%, oper 0.7%, type.inequ 0.6%, integr 0.6%, prove 0.6%, minim 0.5%, theori 0.5%, gener 0.5% *Focuses on the various functions of finite element models, and the mathematics associated with them.*
- Cluster 252: (230) optim 16.0%, set 3.6%, comput 3.5%, function 2.4%, constraint 2.3%, point 2.2%, converg 1.8%, gener 1.6%, linear 1.5%, convex 1.4%, program 1.4%, inequ 1.2%, iter 1.1%, new 1.0%, design 0.9%, data 0.7%, minim 0.7%, variabl 0.7%, object 0.7%, class 0.6%, mesh 0.6%, space 0.6%, random 0.6%, approxim 0.6%, scheme 0.6% *Focuses on computer optimization of data sets, along with optimization functions.*

2.1.2. mathematical modeling and algorithms (4829)

2.1.2.1. genetic algorithms, imaging (1277)

- Cluster 145: (142) algorithm 29.8%, converg 10.3%, iter 4.3%, optim 2.6%, program 2.3%, solv 1.8%, global 1.6%, newton 1.5%, constraint 1.5%, linear 1.2%, numer 1.1%, trust.region 1.0%, linear.program 0.9%, function 0.9%, new 0.8%, algorithm.solv 0.8%, trust 0.7%, comput 0.7%, smooth 0.7%, global.converg 0.6%, point 0.6%, object.function 0.6%, solut 0.5%, quadrat 0.5%, genet.algorithm 0.5% *Focuses on algorithm development, especially modeling, convergence, and optimization.*
- Cluster 198: (326) algorithm 67.6%, comput 1.9%, new 0.6%, model 0.6%, time 0.6%, simul 0.5%, effici 0.5%, new.algorithm 0.4%, path 0.4%, data 0.4%, system 0.3%, optim 0.3%, network 0.3%, algorithm.algorithm 0.3%, adapt 0.3%, rout 0.3%, parallel 0.3%, nois 0.2%, match 0.2%, point 0.2%, gener 0.2%, complex 0.2%, multipl 0.2%, scheme 0.2%, two 0.2% *Focuses on various computer algorithms.*
- Cluster 116: (80) search 37.1%, algorithm 11.4%, tree 2.1%, search.algorithm 2.1%, heurist 2.0%, constraint 1.9%, queri 1.3%, tabu 1.0%, optim 1.0%, local.search 0.9%, distanc 0.8%, mine 0.8%, set 0.7%, genet 0.7%, graph 0.7%, comput 0.7%, genet.algorithm 0.6%, tabu.search 0.6%, model 0.4%, local 0.4%, search.space 0.4%, benchmark 0.4%, line.search 0.4%, pattern

0.3%, train 0.3% *Focuses on algorithms, especially search algorithms, development for specific problems of interest.*

- Cluster 164: (100) algorithm 22.4%, cluster 11.9%, learn 5.0%, data 4.2%, mine 3.0%, set 2.2%, classif 1.6%, rule 1.2%, classifi 1.1%, data.set 1.0%, cluster.algorithm 0.8%, train 0.8%, accuraci 0.8%, data.mine 0.7%, fuzzi 0.7%, pattern 0.6%, discrimin 0.6%, network 0.6%, learn.algorithm 0.6%, kernel 0.6%, recognit 0.5%, model 0.5%, neural 0.5%, text 0.4%, object 0.4% *Focuses on algorithms, with an emphasis on clustering algorithms.*
- Cluster 60: (43) wavelet 52.9%, signal 2.3%, denois 1.4%, wavelet.transform 1.4%, multiresolut 1.4%, frame 1.3%, fault 1.2%, transform 1.0% *Focuses on wavelets.*
- Cluster 170: (95) featur 19.9%, word 12.4%, svm 5.3%, classif 5.3%, classifi 2.3%, charact 2.1%, segment 1.8%, featur.select 1.8%, extract 1.8%, speech 1.4%, select 1.3%, chines 1.0%, vector 0.9%, recognit 0.8%, retriev 0.8%, sentenc 0.7%, machin 0.7%, learn 0.7%, support.vector 0.6%, train 0.5%, support.vector.machin 0.5%, vector.machin 0.5%, string 0.5%, discrimin 0.5%, inform 0.5% *Focuses on speech, voice, and written or typed character characterization and classification, with emphasis on feature/ word extraction.*
- Cluster 36: (91) face 30.5%, recognit 27.6%, face.recognit 5.0%, featur 2.7%, imag 1.9%, discrimin 1.9%, face.imag 1.1%, gabor 1.1% *Focuses on face recognition algorithms.*
- Cluster 189: (400) imag 59.4%, algorithm 1.8%, pixel 1.3%, segment 1.3%, color 1.1%, reconstruct 1.0%, data 0.6%, object 0.6%, textur 0.6%, wavelet 0.5%, featur 0.5%, nois 0.5%, process 0.5%, model 0.5%, fingerprint 0.5%, watermark 0.4%, detect 0.4%, transform 0.4%, resolut 0.4%, system 0.4%, match 0.4%, spatial 0.3%, extract 0.3%, inform 0.3%, robust 0.3% *Focuses on imaging, both the instruments used and the mechanics behind taking images.*

2.1.2.2. system and network modeling, large scale modeling, neural networks (3552)

- Cluster 7: (35) video 63.7%, text 2.4%, segment 1.7%, sport 1.6%, sport.video 1.6%, watermark 1.4%, mpeg 1.2% *Focuses on video, especially sports video, with emphasis on watermarking.*
- Cluster 3: (27) cach 51.8%, proxi 4.2%, video 3.2%, scheme 2.7%, proxi.cach 2.3%, server 2.2%, stream 2.0%, multicast 1.5%, vod 1.5%, client 1.2%, stream.media 1.0%, multimedia 1.0% *Focuses on caching schemes and caches, especially proxy caches, as they relate to media streaming on networks and servers*
- Cluster 83: (114) code 24.0%, channel 6.9%, scheme 4.3%, error 2.6%, symbol 2.5%, estim 1.9%, ofdm 1.8%, bit 1.8%, fade 1.6%, antenna 1.3%, cdma 1.2%, decod 1.1%, ber 1.1%, channel.estim

1.1%, multipl 1.0% *Focuses on coding over channels, with emphasis on errors and fading.*

- Cluster 184: (142) estim 28.6%, error 17.8%, regress 1.9%, likelihood 1.8%, model 1.7%, sampl 1.6%, data 1.3%, asymptot 1.3%, statist 0.9%, maximum.likelihood 0.9%, paramet 0.9%, simul 0.9%, bootstrap 0.8%, distribut 0.7%, test 0.7%, varianc 0.6%, calibr 0.6%, linear 0.6%, squar 0.5%, parametr 0.5%, outlier 0.5%, nonparametr 0.5%, empir 0.5%, accuraci 0.5%, likelihood.estim 0.4% *Focuses on estimation, and the error associated with estimation.*
- Cluster 89: (97) filter 47.0%, nois 18.4%, signal 2.6% *Focuses on filters, especially those designed to reduce noise.*
- Cluster 30: (71) chaotic 32.9%, synchron 11.3%, chaotic.system 9.0%, system 5.8%, chao 4.0%, control 3.7%, feedback 1.7%, chua 1.3% *Focuses on chaotic systems, especially their control and synchronization.*
- Cluster 187: (196) control 43.8%, system 7.0%, control.system 2.2%, model 1.4%, disturb 1.3%, pid 1.2%, nonlinear 1.1%, design 1.0%, simul 1.0%, robot 1.0%, dynam 1.0%, pid.control 0.9%, stabil 0.7%, loop 0.7%, optim 0.7%, robust 0.5%, time 0.5%, track 0.4%, paramet 0.4%, control.scheme 0.4%, algorithm 0.4%, scheme 0.4%, oper 0.4%, output 0.3%, actuat 0.3% *Focuses on various control systems and the controllers themselves.*
- Cluster 13: (104) fuzzi 72.8%, control 2.6%, fuzzi.control 2.3%, system 1.3% *Focuses on mathematically fuzzy concepts, including fuzzy control, fuzzy models, fuzzy logic, etc.*
- Cluster 42: (79) delai 4.9%, matrix.inequ 4.2%, robust 4.1%, system 4.0%, inequ 3.8%, stabil 3.1%, linear.matrix.inequ 3.1%, linear.matrix 3.0%, linear 2.6%, feedback 2.6%, control 2.4%, design 2.3%, lmi 1.8%, matrix 1.8%, output 1.7%, suffici 1.5%, suffici.condit 1.5%, feedback.control 1.5%, time.delai 1.5%, output.feedback 1.4%, close.loop 1.2%, uncertainti 1.1%, time 1.1%, loop 1.0%, condit 1.0% *Focuses on control of linear systems, especially related to time delay and feedback control.*
- Cluster 1: (47) delai 10.2%, neural 9.5%, neural.network 8.8%, network 6.4%, exponenti 4.4%, exponenti.stabil 3.9%, global 3.1%, stabil 3.1%, global.exponenti 2.9%, global.exponenti.stabil 2.1%, time.delai 1.8%, lyapunov 1.4%, inequ 1.4%, suffici.condit 1.3%, suffici 1.2%, cellular.neural 1.1%, neural.network.time 1.0%, cellular.neural.network 1.0%, condit 1.0%, network.time 1.0% *Focuses on the stability of delayed neural networks, particularly cellular neural networks, with emphasis on global exponential stability*
- Cluster 63: : (138) neural.network 22.4%, neural 21.8%, network 16.7%, ann 5.7%, artifici.neural.network 2.0%, artifici.neural 2.0%,

model 2.0%, train 1.6%, artifici 1.4%, network.ann 1.0% *Focuses on neural networks, especially artificial neural networks: (ANNs).*

- Cluster 129: (151) network 60.6%, node 5.6%, connect 1.3%, topolog 0.9%, model 0.7%, sensor 0.7%, scale.free 0.6%, sensor.network 0.5%, dynam 0.4%, simul 0.4%, scale 0.4%, algorithm 0.4%, distribut 0.3%, system 0.3%, small.world 0.3%, world 0.3%, link 0.3%, rout 0.3%, architectur 0.3%, complex.network 0.3%, processor 0.2%, scale.free.network 0.2%, free.network 0.2%, data 0.2%, commun 0.2% *Focuses on networks, specifically computer networks, and the various nodes in a network.*
- Cluster 102: (108) traffic 20.8%, network 8.2%, rout 7.1%, qo 4.3%, packet 3.9%, bandwidth 2.7%, scheme 2.4%, multicast 2.1%, delai 1.6%, internet 1.6%, congest 1.5%, protocol 1.5%, node 1.4%, hoc 1.1%, wireless 1.0% *Focuses on traffic, mainly on internet and electronic traffic.*
- Cluster 4: (54) signatur 33.9%, scheme 25.3%, signatur.scheme 6.9%, proxi 2.6%, secur 2.6%, signer 2.4%, messag 2.3%, proxi.signatur 2.0%, blind.signatur 1.1% *Focuses on signature and signature schemes, including proxy signature schemes, for data encryption*
- Cluster 69: (96) secur 43.6%, protocol 9.3%, attack 4.5%, authent 4.0%, scheme 2.0%, kei 1.4%, encrypt 1.2%, commun 1.2%, messag 1.0% *Focuses on security, especially system and protocol security.*
- Cluster 66: (69) resourc 42.2%, agent 7.1%, digit 3.9%, mobil.agent 3.2%, librari 2.7%, digit.librari 2.3%, system 2.2%, architectur 1.8%, mobil 1.7%, inform 1.1% *Focuses on resource management, especially as it relates to computer networks, with emphasis on mobile agents and digital libraries*
- Cluster 14: (103) grid 56.6%, resourc 7.2%, comput 4.4%, grid.comput 2.7%, servic 2.0%, schedul 1.5%, architectur 1.0% *Focuses on Grid Computing, a system for computer resource sharing.*
- Cluster 51: (116) web 26.7%, semant 15.6%, servic 13.9%, ontolog 11.6%, web.servic 3.6%, inform 2.1% – *Focuses on web services, especially focused on semantic Web aspects.*
- Cluster 87: (70) peer 14.8%, queri 9.3%, xml 8.3%, storag 5.1%, server 3.6%, file 3.1%, data 3.0%, system 1.6%, document 1.6%, peer.peer 1.6%, stream 1.6%, disk 1.5%, web 1.4%, servic 1.2%, node 1.1%, distribut 1.0% *Focuses on systems for storing and sharing data, especially peer to peer (P2P) systems*
- Cluster 10: (40) peer 29.6%, p2p 10.4%, network 8.2%, topolog 6.7%, peer.peer 6.0%, overlai 2.8%, p2p.network 2.1%, search 1.5%, node 1.5%, chord 1.3%, rout 1.3%, queri 1.2%, peer.network 1.0%, peer.peer.network 1.0% *Focuses on peer to peer: (P2P) networks and file-sharing systems, with emphasis on their topology and topological mismatches.*

- Cluster 180: (161) market 26.1%, firm 10.4%, price 8.5%, econom 4.1%, economi 2.9%, trade 2.3%, innov 1.8%, bid 1.2%, institut 1.0%, stock 0.9%, model 0.9%, enterpris 0.8%, china 0.7%, social 0.6%, product 0.6%, reform 0.6%, privat 0.5%, moral 0.5%, equilibrium 0.5%, system 0.5%, polit 0.5%, portfolio 0.5%, cost 0.4%, govern 0.4%, decis 0.4% *Focuses on economics, specifically different markets, firms, and the price of goods in different economies.*
- Cluster 135: (84) decis 36.1%, suppli.chain 3.8%, custom 3.6%, inform 3.2%, suppli 2.3%, linguist 1.7%, risk 1.3%, system 1.3%, product 1.3%, oper 1.2%, model 1.2%, decis.support 1.2%, decis.support.system 1.0%, support.system 1.0%, chain 0.9%, select 0.9%, decis.maker 0.8%, decis.model 0.7%, attribut 0.7%, support 0.7%, maker 0.7%, integr 0.6%, cost 0.6%, onlin 0.6%, new.product 0.6% *Focuses on business structure and business modeling and supply chains, including the role of linguistics in the decision support systems.*
- Cluster 241: (155) project 8.4%, build 6.1%, construct 4.5%, environment 4.3%, kong 2.6%, hong 2.5%, china 2.4%, hong.kong 2.4%, plan 1.5%, articl 1.3%, sustain 1.3%, survei 1.2%, partner 0.9%, social 0.8%, environ 0.8%, disput 0.7%, scienc 0.7%, practic 0.7%, air 0.6%, system 0.6%, tunnel 0.6%, urban 0.6%, factor 0.6%, product 0.6%, commun 0.6% *Focuses on various construction projects, mainly in china.*
- Cluster 212: (122) design 50.6%, system 2.0%, gear 1.3%, model 1.0%, simul 0.9%, assembl 0.8%, architectur 0.7%, circuit 0.7%, optim 0.6%, manufactur 0.6%, product 0.4%, power 0.4%, softwar 0.4%, manipul 0.4%, design.system 0.4%, chip 0.4%, construct 0.4%, gener 0.4%, modul 0.4%, dynam 0.4%, applic 0.3%, regist 0.3%, pile 0.3%, new 0.3%, oper 0.3% *Focuses on the design of new components, systems, and structures.*
- Cluster 253: (246) system 18.7%, oper 3.7%, softwar 2.9%, time 1.8%, reliabl 1.5%, test 1.5%, model 1.4%, data 1.3%, simul 1.2%, machin 1.2%, monitor 1.1%, tool 1.0%, inform 0.9%, environ 0.9%, integr 0.9%, fault 0.9%, applic 0.8%, real 0.8%, new 0.6%, power 0.6%, virtual 0.6%, comput 0.6%, control 0.6%, real.time 0.6%, visual 0.6% *Focuses on systems, with minor emphasis on operating systems and software.*
- Cluster 40: (66) schedul 30.5%, algorithm 8.1%, job 5.8%, time 4.7%, machin 3.2%, process.time 2.5%, minim 2.5%, process 2.0%, makespan 1.4%, schedul.algorithm 1.0%, optim 1.0% *Focuses on machine scheduling and optimization, with emphasis on algorithms that deal with these subjects.*
- Cluster 118: (77) machin 36.7%, svm 4.8%, tool 2.8%, support.vector 2.7%, cut 2.5%, support.vector.machin 2.2%, vector.machin 2.2%, grind 1.8%, vector 1.3%, error 1.1%, pl

1.0%, kernel 0.9%, machin.tool 0.9%, support 0.8%, speed 0.8%, model 0.7%, classif 0.6%, optim 0.6%, case 0.5%, manufactur 0.5%, micro 0.4%, learn 0.4%, descriptor 0.4%, surfac 0.4%, machin.svm 0.4% *Focuses on support vector machines.*

- Cluster 201: (84) model 8.7%, inform 6.7%, forecast 6.2%, data 4.5%, land 4.2%, gi 3.0%, climat 2.5%, spatial 2.0%, ionospher 1.5%, flood 1.5%, map 1.2%, area 1.2%, npp 0.9%, river 0.9%, system 0.8%, knowledg 0.8%, hydrolog 0.8%, rough.set 0.7%, set 0.7%, integr 0.7%, climat.model 0.6%, rainfal 0.6%, time.seri 0.6%, inform.system 0.6%, gp 0.6% *Focuses on environmental forcasting and modeling.*
- Cluster 243: (265) model 54.4%, data 2.0%, system 1.0%, model.model 0.9%, simul 0.8%, paramet 0.6%, dynam 0.5%, test 0.4%, new 0.4%, languag 0.4%, qsar 0.4%, new.model 0.4%, uml 0.3%, gener 0.3%, inform 0.3%, fit 0.3%, construct 0.3%, set 0.3%, mathemat 0.3%, experiment 0.3%, structur 0.3%, statist 0.3%, time 0.3%, comfa 0.2%, predict 0.2% *Focuses on data aquisition and system modeling.*
- Cluster 255: (258) model 16.3%, paramet 2.9%, analyt 2.8%, numer 2.2%, coeffici 1.7%, veloc 1.6%, simul 1.0%, equat 0.9%, experiment 0.9%, diffus 0.9%, data 0.8%, measur 0.8%, system 0.7%, two 0.7%, energi 0.5%, linear 0.5%, solut 0.5%, correl 0.5%, experiment.data 0.5%, curv 0.5%, instabl 0.5%, three 0.4%, mean 0.4%, time 0.4%, function 0.4% *Focuses on models, especially their parametric analyses.*
- Cluster 251: (177) simul 7.3%, fluid 2.9%, scale 2.6%, critic 2.5%, dynam 2.3%, model 2.0%, carlo 1.7%, mont 1.7%, motion 1.6%, mont.carlo 1.6%, theori 1.6%, forc 1.3%, distribut 1.1%, potenti 1.0%, densiti 0.9%, expon 0.9%, function 0.9%, direct 0.8%, eo 0.8%, state 0.7%, fluctuat 0.6%, paramet 0.6%, probabl 0.6%, univers 0.6%, two 0.6% *Focuses on simulations, especially of fluid dynamical systems.*
-

2.2. gene expression and cellular biology

2.2.1. Chinese geophyics and Chinese citizens and their health problems (3638)

2.2.2.1. gene expression, sequencing (1018)

- Cluster 95: (110) strain 20.6%, isol 6.5%, 16 5.9%, sequenc 4.2%, rrna 3.8%, phylogenet 3.1%, 16.rrna 3.0%, speci 2.7%, rrna.gene 2.5%, rdna 2.1%, 16.rrna.gene 2.1%, genu 2.0%, gene.sequenc 1.6%, rrna.gene.sequenc 1.6%, gene 1.4%, dna 1.2%, type.strain 1.0% *Focuses on isolates and strains of micro-organisms or genes, especially rRNA.*
- Cluster 47: (52) dna 29.4%, immobil 17.4%, nucleic 5.2%, nucleic.acid 4.7%, enzym 2.0%, acid 1.3%, immobil.enzym 1.0%,

calf.thymu 1.0% *Focuses on DNA, particularly the immobilization of DNA, and enzymes.*

- Cluster 154: (132) dna 33.9%, mutat 9.8%, pcr 4.5%, gene 3.7%, detect 3.2%, primer 1.7%, sequenc 1.4%, methyl 1.2%, mutant 0.9%, genom 0.8%, probe 0.6%, microarrai 0.6%, oligonucleotid 0.6%, polymeras 0.6%, hybrid 0.5%, hbv 0.5%, cell 0.4%, plasmid 0.4%, promot 0.4%, sampl 0.4%, assai 0.4%, tumor 0.4%, sensit 0.4%, point.mutat 0.4%, cancer 0.4% *Focuses on dna, specifically on detection, characterization, mutation, sequencing.*
- Cluster 143: (114) sequenc 28.3%, genom 9.3%, dna 6.8%, chromosom 3.1%, dna.sequenc 2.7%, clone 2.6%, gene 2.1%, nucleotid 2.1%, isol 1.5%, viru 1.4%, rna 1.0%, strain 0.8%, fragment 0.8%, region 0.6%, code 0.5%, amino.acid 0.5%, pcr 0.5%, rice 0.5%, ident 0.5%, amino 0.5%, hybrid 0.4%, protein 0.4%, mrna 0.4%, replic 0.3%, segment 0.3% *Focuses on dna and genomic sequencing.*
- Cluster 92: (193) gene 13.0%, cdna 7.4%, express 7.2%, sequenc 4.4%, protein 4.1%, amino.acid 3.6%, encod 3.2%, amino 3.1%, clone 2.6%, human 1.9%, acid 1.6%, testi 1.5%, transcript 1.3%, pcr 1.0% *Focuses on genes, especially cDNA.*
- Cluster 59: (90) transgen 25.3%, plant 11.8%, gene 11.4%, express 4.0%, transgen.plant 2.0%, tobacco 1.9%, gu 1.8%, transform 1.5% *Focuses on transgenic experiments, especially those involving transgenic plants.*
- Cluster 173: (327) gene 47.6%, express 10.0%, gene.express 2.1%, transcript 2.0%, protein 1.2%, cell 1.1%, regul 0.9%, promot 0.9%, sequenc 0.9%, mutant 0.6%, strain 0.6%, genom 0.6%, pcr 0.5%, rna 0.5%, mutat 0.5%, cancer 0.4%, activ 0.4%, recombin 0.4%, clone 0.4%, function 0.4%, human 0.4%, microarrai 0.4%, coli 0.3%, mrna 0.3%, tumor 0.3% *Focuses on genes, and gene expression and genetic sequencing.*

2.2.1.2. cellular expression (2721)

- Cluster 133: (166) cancer 20.2%, cell 12.6%, express 5.7%, cancer.cell 4.6%, breast 3.0%, gastric 2.9%, p53 2.8%, tissu 2.4%, mmp 2.0%, breast.cancer 1.6%, carcinoma 1.5%, cell.line 1.5%, tumor 1.5%, apoptosi 1.1%, line 1.0%, protein 1.0%, gastric.cancer 0.8%, human 0.7%, gene 0.7%, mrna 0.7%, invas 0.5%, activ 0.5%, cancer.cell.line 0.5%, normal 0.4%, mcf 0.4% *Focuses on various forms of cancer and possible treatments, and cellular expression.*
- Cluster 100: (170) tumor 37.3%, cell 13.1%, tumor.cell 2.8%, cell.line 2.1%, mice 1.9%, express 1.7%, line 1.3%, carcinoma 1.2%, cancer 1.0% *Focuses on tumors, including tumor growth,*

metastases, treatment, and inhibition, with emphasis on experiments involving cells in mice or cell lines.

- Cluster 178: (223) cell 40.1%, express 3.0%, mice 1.8%, prolifer 1.6%, stem.cell 1.4%, lymphocyt 1.2%, stem 1.2%, differenti 1.2%, bone 1.1%, cd4 0.7%, human 0.7%, activ 0.7%, marrow 0.6%, immun 0.6%, msc 0.6%, cd8 0.6%, induc 0.6%, transplant 0.6%, bone.marrow 0.6%, cultur 0.6%, cytokin 0.5%, progenitor 0.5%, stimul 0.5%, vitro 0.5%, regul 0.4% *Focuses on various kinds of cells and their attributes, along with cellular expression.*
- Cluster 221: (359) cell 62.4%, cultur 1.3%, express 1.2%, human 0.7%, protein 0.6%, activ 0.6%, membran 0.5%, cell.line 0.4%, concentr 0.4%, inhibit 0.4%, growth 0.4%, endotheli 0.4%, transfect 0.3%, line 0.3%, tissu 0.3%, assai 0.3%, infect 0.3%, prolifer 0.3%, gene 0.3%, embryo 0.3%, cytoplasm 0.2%, endotheli.cell 0.2%, control 0.2%, regul 0.2%, product 0.2% *Focuses on various kinds of cells, expression of those cells, and gene expression.*
- Cluster 110: (204) cell 32.9%, apoptosi 13.7%, induc 3.6%, bcl 2.0%, caspas 2.0%, inhibit 1.4%, apoptot 1.4%, express 1.3%, activ 1.2%, prolifer 1.1%, induc.apoptosi 1.0%, cell.cycl 0.9%, death 0.8%, protein 0.7%, cell.death 0.7%, cell.apoptosi 0.6%, k562 0.6%, dna 0.5%, arrest 0.5%, cell.line 0.5%, cycl 0.5%, bax 0.5%, inhibitor 0.4%, ro 0.4%, regul 0.4% *Focuses on multiple types of cells and what affects them, emphasizing apoptosis.*
- Cluster 171: (144) kinas 9.6%, receptor 7.6%, activ 6.1%, phosphoryl 5.9%, induc 4.6%, signal 3.3%, protein 2.6%, inhibit 2.1%, cell 1.8%, protein.kinas 1.7%, kappab 1.7%, pathwai 1.5%, regul 1.5%, mapk 1.4%, inhibitor 1.3%, mediat 1.2%, express 1.1%, pka 0.9%, pkc 0.9%, camp 0.9%, p38 0.8%, erk 0.6%, beta 0.6%, tyrosin 0.5%, stimul 0.5% *Focuses on kinase and receptor activation,and the signaling of the cells between the receptors.*
- Cluster 245: (154) activ 10.5%, inhibit 9.1%, induc 3.9%, antioxid 3.1%, oocyt 2.6%, inhibitor 2.6%, stimul 1.2%, cell 1.1%, concentr 1.1%, no 1.0%, glucos 0.9%, oxid 0.8%, depend 0.7%, ach 0.7%, platelet 0.6%, dose 0.6%, mumol 0.6%, scaveng 0.6%, inhibitori 0.6%, vitro 0.6%, cultur 0.5%, manner 0.5%, melatonin 0.5%, depend.manner 0.5%, h2o2 0.5% *Focuses on various chemicals or molecules/compounds that have an effect on the body (activation or inhibition) or the body's reaction to various stimuli.*
- Cluster 34: (68) ca2 57.2%, channel 3.0%, intracellular 1.8%, calcium 1.3%, cell 1.2% *Focuses on the calcium ion, Ca+2, particulary as it relates to cells and cellular functions.*
- Cluster 96: (107) neuron 49.9%, receptor 2.2%, neuroprotect 1.4%, induc 1.3%, gaba 1.3%, activ 1.1%, rat 1.1%, glutam 1.0% *Focuses on neurons.*

- Cluster 228: (260) rat 31.4%, brain 2.8%, dose 2.2%, inject 1.7%, induc 1.6%, express 1.6%, administr 1.4%, receptor 1.2%, drug 1.1%, group 1.0%, ischemia 1.0%, liver 0.9%, reperfus 0.8%, level 0.8%, injuri 0.7%, mrna 0.7%, diabet 0.7%, activ 0.7%, heart 0.5%, blood 0.5%, treatment 0.5%, protein 0.5%, oral 0.5%, cell 0.5%, myocardi 0.4% *Focuses on experiments performed on rats, especially impacts on their brain.*
- Cluster 176: (137) express 8.1%, tgf 7.3%, tnf 4.0%, tnf.alpha 3.1%, tgf.beta 3.1%, mrna 3.1%, alpha 2.9%, mmp 2.3%, vegf 1.6%, beta 1.5%, level 1.5%, cytokin 1.4%, beta1 1.2%, lung 1.2%, cell 1.2%, activ 1.2%, tgf.beta1 1.1%, protein 1.0%, rat 1.0%, induc 1.0%, factor 1.0%, receptor 1.0%, growth.factor 0.9%, macrophag 0.9%, bone 0.9% *Focuses on cellular expresson and tumor necrosis factor alpha and transforming growth factor.*
- Cluster 155: (88) mice 49.8%, induc 1.7%, dose 1.6%, express 1.5%, level 1.2%, group 0.7%, treat 0.7%, increas 0.6%, activ 0.5%, protect 0.5%, inhibit 0.5%, administr 0.5%, liver 0.5%, control 0.4%, receptor 0.4%, brain 0.4%, mrna 0.4%, tissu 0.3%, anim 0.3%, morphin 0.3%, decreas 0.3%, histamin 0.3%, infect 0.3%, acid 0.3%, mous 0.2% *Focuses on the use of mice in medical experiments.*
- Cluster 79: (82) vaccin 9.9%, antibodi 9.8%, immun 9.1%, antigen 5.7%, epitop 4.7%, viru 2.8%, assai 1.9%, mab 1.8%, mice 1.6%, elisa 1.5%, respons 1.5%, protein 1.4%, infect 1.3%, peptid 1.3%, dna.vaccin 1.2%, dna 1.1%, influenza 1.0% *Focuses on antibodies, vaccines, and immunity.*
- Cluster 219: (198) protein 13.6%, peptid 3.9%, bind 3.3%, activ 3.1%, fusion 3.1%, express 2.7%, purifi 2.7%, coli 2.5%, mutant 2.0%, domain 2.0%, recombin 2.0%, fusion.protein 1.9%, enzym 1.7%, termin 1.1%, refold 1.0%, residu 0.9%, escherichia.coli 0.8%, human 0.8%, escherichia 0.8%, cell 0.8%, pollen 0.8%, mutat 0.7%, gst 0.6%, site 0.6%, subunit 0.5% *Focuses on proteins and their characterization and use.*
- Cluster 177: (222) protein 58.4%, bind 1.5%, sequenc 0.7%, proteom 0.6%, express 0.6%, interact 0.6%, human 0.6%, cell 0.5%, membran 0.5%, amino.acid 0.5%, amino 0.5%, bind.protein 0.4%, function 0.4%, electrophoresi 0.4%, membran.protein 0.4%, gel 0.4%, mass 0.4%, spot 0.3%, serum 0.3%, regul 0.3%, domain 0.3%, protein.protein 0.3%, acid 0.3%, hsa 0.3%, detect 0.3% *Focuses on proteins, and protein separation, and protein analysis.*
- Cluster 0: (59) sar 32.3%, cov 19.5%, sar.cov 16.0%, protein 3.2%, coronaviru 2.3% *Focuses on proteins, viruses, antibodies and vaccines related to SARS: (Severe Acute Respiratory Syndrome)*
- Cluster 23: (80) sar 37.1%, patient 6.0%, acut 3.5%, syndrom 3.0%, respiratori 2.7%, acut.respiratori 2.5%, sever.acut.respiratori 2.3%, sever.acut 2.3%, acut.respiratori.syndrom 2.1%,

respiratori.syndrom 2.1%, sar.patient 2.0%, sever 1.8%, cov 1.6%, outbreak 1.4%, syndrom.sar 1.4%, respiratori.syndrom.sar 1.4%, infect 1.3%, coronaviru 1.1%, sar.cov 1.1%, flap 1.0% *Focuses on SARS: (Severe Acute Respiratory Syndrome), particularly studies involving SARS patients, cases and outbreaks.*

2.2.2. genetic expression, and cells, mainly cancer cells (3739)
2.2.2.1. Chinese medical patients (1837)

- Cluster 203: (112) arteri 11.5%, stent 5.8%, lesion 4.7%, patient 4.1%, coronari 2.5%, year.old 1.8%, case 1.8%, year 1.6%, tumour 1.6%, aortic 1.6%, old 1.4%, pain 1.3%, left 1.3%, carotid 1.0%, stenosi 1.0%, blood 1.0%, right 0.9%, vessel 0.9%, diagnosi 0.8%, coronari.arteri 0.8%, group 0.8%, angiographi 0.7%, month 0.7%, diseas 0.7%, aneurysm 0.7% *Focuses on the circulatory system, emphasizing arteries and stents, and clinical problems associated with various patients.*
- Cluster 215: (113) patient 6.7%, group 4.8%, renal 4.7%, transplant 3.3%, treatment 3.1%, month 3.0%, postop 2.5%, liver 2.4%, case 1.9%, mmf 1.7%, graft 1.4%, donor 1.3%, implant 1.3%, outcom 1.3%, clinic 1.1%, surviv 1.0%, year 0.9%, surgic 0.8%, nerv 0.8%, complic 0.8%, liver.transplant 0.8%, surgeri 0.8%, rate 0.8%, blood 0.7%, laparoscop 0.7% *Focuses on the renal system, and patients who have renal problems and some of their treatments.*
- Cluster 167: (466) patient 62.1%, diseas 1.2%, year 1.1%, treatment 1.0%, group 1.0%, clinic 1.0%, month 0.7%, surviv 0.6%, score 0.5%, therapi 0.5%, control 0.5%, ag 0.4%, tumor 0.4%, hospit 0.4%, outcom 0.4%, cancer 0.4%, recurr 0.3%, symptom 0.3%, rate 0.3%, 001 0.3%, risk 0.3%, level 0.3%, mean 0.3%, chines 0.3%, serum 0.2% *Focuses on medical patients and their medical problems.*
- Cluster 216: (141) group 40.5%, control.group 2.4%, control 2.1%, treatment 1.2%, group.group 1.2%, diet 1.1%, rat 0.9%, serum 0.8%, pig 0.7%, dose 0.6%, dai 0.6%, subject 0.6%, week 0.6%, children 0.6%, placebo 0.5%, supplement 0.5%, level 0.5%, fed 0.5%, blood 0.5%, femal 0.5%, group.control 0.5%, male 0.5%, plasma 0.4%, egg 0.4%, administr 0.4% *Focuses on medical/ biological experiments, and talks about the different groups in the experiment.*
- Cluster 161: (78) egg 10.9%, diet 8.8%, larva 6.3%, feed 6.3%, fed 4.9%, fish 4.0%, dietari 3.0%, toxic 1.2%, femal 1.0%, reproduct 1.0%, growth 1.0%, fertil 1.0%, mmt 1.0%, dai 0.9%, rate 0.9%, larval 0.9%, lipid 0.9%, level 0.7%, embryo 0.7%, exposur 0.7%, weight 0.7%, adult 0.6%, shrimp 0.6%, hatch 0.6%, bodi 0.6% *Focuses on the interaction of insects and their predators, and what influences the mortality of insects/fish.*

- Cluster 232: (168) women 11.9%, ag 5.6%, subject 4.5%, male 2.5%, pregnanc 1.6%, risk 1.5%, serum 1.4%, blood 1.4%, femal 1.3%, level 1.3%, year 1.3%, infant 1.2%, chines 1.1%, men 1.0%, bmd 0.9%, bodi 0.9%, group 0.9%, intak 0.9%, obes 0.9%, birth 0.8%, bone 0.7%, sex 0.7%, injuri 0.7%, bmi 0.6%, cadmium 0.6% *Focuses on various clinical medical studies, usually involving women.*
- Cluster 141: (100) preval 12.0%, hiv 9.2%, smoke 5.0%, sexual 4.3%, risk 3.1%, china 2.2%, infect 1.8%, health 1.5%, smoker 1.4%, femal 1.4%, drug 1.3%, ag 1.3%, women 1.2%, rural 1.2%, chines 1.2%, male 1.2%, year 1.0%, survei 0.9%, sex 0.9%, hiv.aid 0.9%, aid 0.9%, diseas 0.9%, worker 0.9%, men 0.8%, popul 0.8% *Focuses on sexually transmitted diseases such as HIV. Also focuses on smoking and its health problems, as well as other respiratory ailments.*
- Cluster 138: (109) kong 13.4%, hong 13.3%, hong.kong 12.7%, health 5.4%, sar 4.4%, care 2.4%, chines 1.1%, women 1.0%, practic 1.0%, risk 0.7%, psycholog 0.5%, ag 0.5%, medic 0.5%, social 0.5%, perceiv 0.5%, health.care 0.5%, influenza 0.4%, nurs 0.4%, respond 0.4%, popul 0.4%, singapor 0.4%, worker 0.4%, hospit 0.4%, diseas 0.4%, peopl 0.4% *Focuses on health problems among Chinese citizens, especially in Hong Kong.*
- Cluster 153: (99) children 15.2%, chines 10.5%, social 8.0%, school 7.4%, cultur 4.0%, adolesc 2.6%, moral 1.7%, parent 1.2%, teacher 1.1%, kong 1.0%, hong 1.0%, hong.kong 1.0%, child 0.8%, self 0.7%, ag 0.7%, depress 0.7%, belief 0.7%, peer 0.7%, compet 0.6%, dental 0.6%, score 0.6%, perceiv 0.5%, person 0.5%, year 0.5%, support 0.4% *Focuses on various social and health characteristics and behaviours of Chinese citizens and children.*
- Cluster 93: (53) chines 26.2%, famili 14.7%, mutat 8.8%, popul 4.2%, hear 2.4%, medicin 1.6%, genet 1.5%, diseas 1.3%, chines.medicin 1.2%, unrel 1.2%, gene 1.1%, chines.famili 1.0% *Focuses on Chinese families, with emphasis on genetics and medicine.*
- Cluster 48: : (79) cancer 18.8%, risk 18.4%, genotyp 6.4%, polymorph 4.5%, escc 1.6%, gastric 1.4%, lung.cancer 1.4%, lung 1.3%, control 1.1%, case 1.1%, cancer.risk 1.0%, allel 1.0% *Focuses on cancer risk and control.*
- Cluster 53: (104) polymorph 10.9%, genotyp 10.4%, allel 10.3%, snp 4.3%, haplotyp 4.3%, schizophrenia 4.0%, gene 3.8%, chines 3.0%, popul 2.1%, hypertens 1.8%, han 1.7%, subject 1.5%, bmd 1.1%, frequenc 1.1%, patient 1.0% *Focuses on specific types of genes, especially polymorphs, and their functions.*
- Cluster 76: (108) popul 24.8%, genet 16.3%, divers 4.2%, polymorph 2.7%, genet.divers 2.6%, allel 1.9%, primer 1.8%, haplotyp 1.8%, ssr 1.8%, microsatellit 1.6%, speci 1.3%, china

1.2%, marker 1.1%, sequenc 1.0%, loci 1.0% *Focuses on genetic diversity in populations.*

- Cluster 86: (107) qtl 13.4%, chromosom 11.4%, marker 5.2%, trait 5.1%, rice 3.8%, map 2.7%, genet 2.7%, hybrid 2.3%, genom 1.9%, seed 1.8%, parent 1.5%, line 1.3%, loci 1.2%, gene 1.1%, resist 1.1%, popul 1.0% *Focuses on chromosomes and genes, especially genetic markers and traits.*

2.2.2.2. Soils, plants and rare earth elements (1801)

- Cluster 57: (147) rock 9.9%, zircon 7.1%, ag 5.3%, mantl 4.5%, granit 3.8%, metamorph 3.5%, isotop 2.6%, basalt 1.9%, similar 1.5%, north 1.4%, crust 1.4%, geochem 1.3%, magma 1.1%, date 1.1%, subduct 1.1%, ree 1.1%, gneiss 1.0%, magmat 1.0% *Focuses on rock and mantle beneath North China, with emphasis on isotope dating.*
- Cluster 78: (75) late 6.7%, basin 5.8%, permian 3.7%, rock 3.1%, triassic 3.0%, earli 2.9%, jurass 2.8%, format 2.7%, cretac 2.3%, china 1.9%, middl 1.8%, sourc.rock 1.8%, south 1.6%, belt 1.6%, volcan 1.5%, sourc 1.3%, zone 1.3%, oil 1.3%, southern 1.1%, mesozo 1.1% *Focuses on geological formations in China, with emphasis on determination of geologic age.*
- Cluster 156: (113) seismic 14.3%, fault 5.4%, earthquak 5.0%, basin 4.5%, veloc 4.0%, crust 3.0%, mantl 2.3%, river 2.0%, wave 2.0%, reservoir 1.7%, crustal 1.6%, moho 1.5%, zone 1.4%, area 1.3%, tecton 1.3%, geolog 1.1%, belt 0.9%, wave.veloc 0.8%, depth 0.7%, region 0.7%, seismic.wave 0.6%, rock 0.6%, upper 0.6%, beneath 0.6%, uplift 0.5% *Focuses on seismic activity, including earthquakes.*
- Cluster 166: (95) wind 30.0%, dust 10.4%, solar 3.1%, storm 2.2%, latitud 1.9%, region 1.0%, aerosol 0.8%, radiat 0.8%, satellit 0.8%, model 0.8%, cloud 0.8%, dust.storm 0.8%, ionospher 0.6%, build 0.6%, data 0.6%, solar.activ 0.5%, sunspot 0.5%, transport 0.5%, atmospher 0.5%, particl 0.5%, period 0.5%, lightn 0.5%, forc 0.4%, summer 0.4%, pollut 0.4% *Focuses on wind, both solar wind and lower atmospheric wind; includes wind modeling, and wind damage, as well as particulates in the wind such as dust and aerosols.*
- Cluster 218: (147) sea 6.3%, ocean 4.1%, model 2.8%, season 2.3%, climat 2.1%, tidal 1.9%, permafrost 1.8%, enso 1.7%, data 1.3%, surfac 1.2%, circul 1.2%, pacif 1.2%, sediment 1.2%, anomali 1.0%, cloud 1.0%, water 1.0%, warm 1.0%, east 1.0%, front 1.0%, summer 0.9%, transport 0.9%, rainfal 0.9%, atmospher 0.8%, north 0.8%, ic 0.8% *Focuses on creating climate models,especially over water or near coasts, and various ways to*

determine moisture concentrations and ways of measuring various quantities that affect climate, such as moisture etc.

- Cluster 209: (171) china 9.5%, climat 4.6%, monsoon 4.5%, summer 4.0%, sea 2.3%, east 1.7%, urban 1.6%, region 1.6%, warm 1.5%, land 1.4%, south 1.3%, winter 1.2%, glacial 1.2%, asian 1.1%, north 1.1%, dust 1.0%, summer.monsoon 1.0%, ic 1.0%, area 0.9%, site 0.9%, plateau 0.9%, loess 0.8%, season 0.8%, basin 0.8%, delta 0.7% *Focuses on climate analysis (especially monsoons) and indoor air pollutant studies, mainly in china and the surrounding areas.*
- Cluster 142: (121) sediment 26.5%, lake 10.7%, river 6.6%, water 4.4%, estuari 3.2%, coastal 1.9%, concentr 1.2%, china 0.8%, sea 0.8%, bai 0.8%, season 0.7%, pcb 0.7%, pah 0.6%, pearl.river 0.6%, pearl 0.6%, area 0.6%, river.estuari 0.6%, nutrient 0.6%, tidal 0.5%, level 0.5%, fish 0.4%, phosphoru 0.4%, tide 0.4%, pearl.river.estuari 0.4%, reef 0.4% *Focuses on sediments and sediment tracking and contamination in various water sources; lakes, rivers, estuaries, seas, etc.*
- Cluster 58: (235) soil 70.6%, fertil 1.4% *Focuses on soil, especially the effects of soil properties on plants, in China*
- Cluster 197: (144) plant 18.1%, root 16.7%, rice 3.7%, shoot 3.2%, leaf 3.1%, leav 2.0%, water 1.6%, concentr 1.2%, uptak 1.1%, nutrient 0.9%, stomat 0.8%, toler 0.8%, medium 0.7%, content 0.7%, cultivar 0.7%, growth 0.7%, treatment 0.6%, biomass 0.6%, irrig 0.6%, wheat 0.5%, increas 0.5%, photosynthet 0.5%, stem 0.5%, ecotyp 0.5%, stress 0.4% *Focuses on plants, and plant roots. Includes waste remediation using plants, various health benefits of plants, and plant characterization and analysis.*
- Cluster 159: (90) seed 14.2%, germin 9.8%, forest 7.5%, seedl 3.8%, cotton 3.3%, season 3.1%, leaf 3.0%, biomass 2.8%, wheat 2.3%, canopi 2.2%, cultivar 1.7%, plant 1.5%, tree 1.1%, seed.germin 0.9%, year 0.9%, veget 0.8%, tea 0.7%, grassland 0.7%, grow.season 0.6%, china 0.6%, growth 0.5%, npp 0.5%, rice 0.5%, area 0.5%, stand 0.4% *Focuses on all matter of plants, both food plants and non-food plants, including seeds and their properties, such as germination rate*
- Cluster 165: (170) speci 60.3%, genu 1.1%, plant 1.1%, china 1.0%, phylogenet 0.9%, sequenc 0.8%, genera 0.7%, collect 0.7%, morpholog 0.6%, habitat 0.5%, region 0.4%, taxa 0.4%, tree 0.4%, group 0.3%, two 0.3%, asia 0.3%, two.speci 0.3%, plant.speci 0.3%, forest 0.3%, fungi 0.2%, domin 0.2%, taxonom 0.2%, clade 0.2%, charact 0.2%, divers 0.2% *Focuses on various species of organisms and plants, and their characteristics. Also talks about DNA and comparing it between species.*
- Cluster 29: (143) speci 35.2%, new.speci 19.2%, genu 8.4%, china 6.2%, new 6.1%, speci.genu 1.8%, new.scienc 1.0% *Focuses on the*

identification of mainly zoological and entomological species in China.

- Cluster 244: (150) china 11.1%, pollen 4.2%, speci 2.8%, new 2.0%, genu 1.7%, fossil 1.5%, morpholog 1.3%, stamen 1.3%, provinc 1.2%, cirri 1.1%, pollin 1.1%, genera 1.0%, taxa 1.0%, flower 0.9%, ventral 0.9%, type 0.9%, earli 0.8%, ornament 0.8%, var 0.8%, corolla 0.8%, kineti 0.7%, male 0.7%, femal 0.7%, scienc 0.7%, pollen.grain 0.6% *Focuses on plant species.*

Appendix 5 – DTIC Taxonomy

SUBJECT	SUB-SUBJ
AVIATION	Aerodynamics
	Military Aircraft Operations
	Aircraft
	Helicopters
	Bombers
	Attack & Fighter Aircraft
	Patrol & Reconnaissance Aircraft
	Transport Aircraft
	Training Aircraft
	V/STOL
	Gliders & Parachutes
	Civilian Aircraft
	Pilotless Aircraft, RPV, Drones
	Lighter-than-air Aircraft
	Research & Experimental Aircraft
	Flight Control & Instrumentation
	Terminal Flight Facilities
	Commercial & General Aviation
AGRICULTURE	Agricultural Chemistry
	Agricultural Economics
	Agricultural Engineering
	Agronomy, Horticulture & Aquiculture
	Animal Husbandry & Veterinary Medicine
	Forestry
ASTRONOMY & ASTROPHYSICS	Astronomy
	Astrophysics
	Celestial
ATMOSPHERIC SCIENCES	Atmospheric Physics
	Meteorology
BEHAVIORAL & SOCIAL SCIENCES	Administration & Management
	Information Science
	Economics & Cost Analysis
	Government & Political Science
	Sociology & Law
	Humanities & History
	Linguistics
	Psychology
	Personnel Management & Labor Relations
BIOLOGICAL & MEDICAL SCIENCES	Biochemistry

	Genetic Engineering & Molecular Biology
	Biology
	Anatomy & Physiology
	Medicine & Medical Research
	Ecology
	Radiobiology
	Food, Food Service & Nutrition
	Hygiene & Sanitation
	Stress Physiology
	Toxicology
	Medical Facilities, Equipment & Supplies
	Microbiology
	Weapons Effects (Biological)
	Pharmacology
CHEMISTRY	Industrial Chemistry & Chemical Processing
	Inorganic Chemistry
	Organic Chemistry
	Physical Chemistry
	Radiation & Nuclear Chemistry
	Polymer Chemistry
EARTH SCIENCES & OCEANOGRAPHY	Biological Oceanography
	Cartography & Aerial Photography
	Physical & Dynamic Oceanography
	Geomagnetism
	Geodesy
	Geography
	Geology, Geochemistry & Mineralogy
	Hydrology, Limnology & Potamology
	Mining Engineering
	Soil Mechanics
	Seismology
	Snow, Ice, & Permafrost
ELECTROTECHNOLOGY & FLUIDICS	Electrical & Electronic Equipment
	Fluidics & Fluerics
	Lasers & Masers
	Line, Surface & Bulk Acoustic Wave Devices
	Electrooptical & Optoelectronic Devices
	Acoustooptic & Optoacoustic Devices
	Electromagnetic Shielding
POWER PRODUCTION & ENERGY CONVERSION (NON-PROPULSIVE)	Non-electrical Energy Conversion
	Electric Power Production & Distribution
	Electrochemical Energy Storage

	Energy Storage
MATERIALS	Adhesives, Seals & Binders
	Ceramics, Refractories & Glass
	Refractory Fibers
	Coatings, Colorants & Finishes
	Laminates & Composite Materials
	Textiles
	Metallurgy & Metallography
	Properties of Metals & Alloys
	Fabrication Metallurgy
	Miscellaneous Materials
	Lubricates & Hydraulic Fluids
	Plastics
	Elastomers & Rubber
	Solvents, Cleaners & Abrasives
	Wood, Paper & Related Forestry Products
MATHEMATICAL & COMPUTER SCIENCES	Numerical Mathematics
	Theoretical Mathematics
	Statistics & Probability
	Operations Research
	Computer Programming & Software
	Computer Hardware
	Computer Systems
	Computer Systems Management & Standards
	Cybernetics
MECHANICAL, INDUSTRIAL, CIVIL & MARINE ENGINEERING	Air Conditioning, Lighting, Heating, & Ventilating
	Civil Engineering
	Construction Equipment, Materials & Supplies
	Containers & Packaging
	Couplers, Fasteners & Joints
	Surface Transportation & Equipment
	Surface Effect Vehicles & Amphibious Vehicles
	Hydraulic & Pneumatic Equipment
	Manufacturing & Industrial Engineering & Control of Production Systems
	Machinery & Tools
	Marine Engineering
	Submarine Engineering
	Pumps, Filters, Pipes, Tubing, Fittings & Valves
	Safety Engineering
	Structural Engineering & Building Technology
TEST EQUIPMENT, RESEARCH FACILITIES & REPROGRAPHY	Holography

	Test Facilities, Equipment & Methods
	Recording & Playback Devices
	Photography
	Printing & Graphic Arts
MILITARY SCIENCES	Military Forces & Organizations
	Civil Defense
	Defense Systems
	Antimissile Defense Systems
	Antiaircraft Defense Systems
	Antisatellite Defense Systems
	Military Intelligence
	Logistics, Military Facilities & Supplies
	Military Operations, Strategy & Tactics
	Naval Surface Warfare
	Undersea & Antisubmarine Warfare
	Chemical, Biological & Radiological Warfare
	Nuclear Warfare
	Space Warfare
	Land Mine Warfare
	Unconventional Warfare
GUIDED MISSILE TECHNOLOGY	Guided Missile Launching & Basing Support
	Guided Missile Trajectories, Accuracy & Ballistics
	Guided Missile Dynamics, Configurations & Control Surfaces
	Guided Missile Warheads & Fuzes
	Guided Missiles
	Air- & Space-Launched Guided Missiles
	Surface-Launched Guided Missiles
	Underwater-Launched Guided Missiles
	Guided Missile Reentry Vehicles
NAVIGATION, DETECTION & COUNTERMEASURES	Acoustic Detection & Detectors
	Non-acoustic & Non-magnetic Submarine Detection
	Direction Finding
	Countermeasures
	Radio Countermeasures
	Acoustic Countermeasures
	Radar Countermeasures
	Optical Countermeasures
	Optical Detection & Detectors
	Infrared Detection & Detectors
	Ultraviolet Detection and Detectors
	Magnetic & Electric Field Detection & Detectors
	Navigation & Guidance
	Land & Riverine Navigation & Guidance

	Underwater & Marine Navigation & Guidance
	Air Navigation & Guidance
	Space Navigation & Guidance
	Miscellaneous Detection & Detectors
	Active & Passive Radar Detection Equipment
	Seismic Detection & Detectors
	Target Direction, Range & Position Finding
NUCLEAR SCIENCE & TECHNOLOGY	Fusion Devices (Thermonuclear)
	Isotopes
	Nuclear Explosions & Devices (Non-Military)
	Nuclear Instrumentation
	Nuclear Power Plants & Fission Reactor Engineering
	Nuclear Fission Reactors (Power)
	Nuclear Fission Reactors (Non-Power)
	Nuclear Radiation Shielding, Protection & Safety
	Radioactivity, Radioactive Wastes & Fission Products
	SNAP (Systems for Nuclear Auxiliary Power)
	Fission Reactor Physics
	Fission Reactor Materials
ORDANCE	Ammunition & Explosives
	Pyrotechnics
	Aerial Bombs
	Combat Vehicles
	Armor
	Fire Control & Bombing Systems
	Guns
	Rockets
	Underwater Ordance
	Torpedoes
	Explosions
	Ballistics
	Nuclear Weapons
	Directed Energy Weapons
	Guided Munitions
PHYSICS	Acoustics
	Crystallography
	Electricity & Magnetism
	Fluid Mechanics
	Atomic & Molecular Physics & Spectroscopy
	Optics
	Fiber Optics & Integrated Optics
	Particle Accelerators
	Nuclear Physics & Elementary Particle Physics

	Plasma Physics & Magneto-hydrodynamics
	Quantum Theory & Relativity
	Mechanics
	Solid State Physics
	Thermodynamics
	Radiofrequency Wave Propagation
	Electromagnetic Pulses
PROPULSION, ENGINES & FUELS	Air Breathing Engines
	Combustion & Ignition
	Electric & Ion Propulsion
	Fuels
	Jet & Gas Turbine Engines
	Nuclear Propulsion
	Reciprocating & Rotating Engines
	Rocket Engines
	Liquid Propellant Rocket Engines
	Solid Propellant Rocket Engines
	Rocket Propellants
	Liquid Rocket Propellants
	Solid Rocket Propellants
SPACE TECHNOLOGY	Astronautics
	Unmanned Spacecraft
	Spacecraft Trajectories & Reentry
	Ground Support Systems & Facilities for Space Vehicles
	Manned Spacecraft
BIOTECHNOLOGY	Biomedical Instrumentation & Bioengineering
	Human Factors Engineering & Man Machine Systems
	Bionics
	Protective Equipment
	Life Support Systems
	Escape, Rescue & Survival
ENVIRONMENTAL POLLUTION & CONTROL	Air Pollution & Control
	Noise Pollution & Control
	Solid Wastes Pollution & Control
	Water Pollution & Control
	Pesticides, Pollution & Control
	Radiation Pollution & Control
	Environmental Health & Safety
COMMUNICATIONS	Telemetry
	Radio Communications
	Non-Radio Communications

	Voice Communications
	Command, Control & Communications Systems

Appendix 6 – Word Factor Themes
-Science Citation Index
-40 Factors
-2002 Data

A factor analysis with forty factors was conducted on the retrieved Abstracts from the 2002 database. A phrase frequency analysis of the retrieved Abstracts was performed, and the high frequency, highly technical words were selected. A correlation matrix of these words was generated by the TechOasis software, followed by a factor matrix. Each factor from the factor matrix was analyzed. Each factor is summarized in this Appendix. The format is the factor number, followed by the high factor loading words in the factor matrix for the factor being analyzed, followed by a brief descriptive summary of the factor's theme. Table A6-1 (below) contains a summary of the factor descriptions.

Factor 1
(inhibited, cells, rat, inhibitor, manner, induced, inhibition, inhibitory, receptor, cell, apoptosis, mediated)

Focuses on the biological sciences of cell physiology, primarily using cells from rats.

Factor 2
(plasma, velocity, source, flux, gas, flow, pressure, profile, distribution, mass, heat, density)

Focuses on the physical properties of plasmas and gases related their flow and distribution.

Factor 3
(bonds, hydrogen, atoms, coordination, interactions, ligand, atom, ligands, O, molecules, complex, bonding, bond, crystal, network)

Focuses on atomic physics, specifically the interactions and bonding on atoms, molecules, ligands, crystals, primarily those of hydrogen and oxygen.

Factor 4
(early, late, middle, upper, region, zone, stage)

Focuses on the temporal (early and late) and location (middle, upper) divisions of regions and processes (eg. stages).

Factor 5
(detection, determination, limit, deviation, standard, ranged, linear, sensitive)

Focuses on the metric properties of detection such as limits, ranges, mathematical statistics, and sensitivities.

Factor 6
(patients, risk, age, patient, P, disease, background, population, association, cases, controls, cancer, interval, incidence, diagnosis)

Focuses on medical studies of humans for cancer research and potential causes and risk factors.

Factor 7
(strength, composites, fracture, mechanical, tensile, crack, composite, modulus, matrix)

Focuses on the physical properties of composite materials.

Factor 8
(cDNA, protein, amino, expressed, gene, expression, sequence)

Focuses on genetic sequencing biology.

Factor 9
(Z, beta, V, monoclinic, space, gamma, alpha)

Focuses on physical properties to define crystal structures.

Factor 10
(polymerization, polymer, polymers, copolymer, solvent, reaction, aqueous, molecular, radical)

Focuses on the synthesis and reactions of polymers, copolymers, and solvents.

Factor 11
(film, films, substrates, thin, deposition, deposited, substrate, --- grown, thickness, Si)

Focuses on the growth, deposition, and thickness of thin films and substrates, primarily with the material Si.

Factor 12
(catalyst, catalysts, catalytic, selectivity, activity, conversion, oxidation, co, reaction, active, reduction)

Focuses on properties of physical chemistry such as catalysts, oxidation, reactions, and reduction of CO.

Factor 13
Tail [-.288 to -.224] – (binding, affinity, recombinant, purified, vitro, antibody, activity)

Tail [.213 to .163] – (mRNA, blot, Northern)

Focuses on molecular biology properties associated with mRNA such as binding, affinity, and purity.

Factor 14
(particles, particle, powders, size, XRD, powder, TEM, --- sol-gel, nanoparticles, tiO2)

Focuses on the study of microstructures such as nanoparticles, powders using techniques like X-ray diffraction, TEM, and sol-gel.

Factor 15
(emission, spectra, absorption, fluorescence, excitation, blue, excited, red, intensity, wavelength, band, spectrum, UV, light)

Focuses on physical properties of spectroscopy such as emissions, spectra, absorption, fluorescence in the red, blue, and UV wavelength regions of the energy spectrum.

Factor 16
(equations, solutions, elements, earth, rare, element, solving, existence, nonlinear, solution, numerical)

Focuses on applied numerical mathematics of the chemistry of rare earth elements.

Factor 17
(increasing, decreases, increase, increases, decrease, increased, content, decreased, decreasing, temperature, size, higher, maximum, grain, ratio, rate)

Focuses on the change in physical properties of material composition of grains due to changes in temperature.

Factor 18
(energies, energy, ground, states, theory, bond, state, excited, quantum, density, level)

Focuses on the physical properties of quantum physics theory associated with energy such as energy states, energy levels, bonding energy, energy densities, and excitation energies.

Factor 19
(electrode, electrochemical, cyclic, impedance, solution, surface, potential, pH, modified)

Focuses on the physical chemistry properties used to characterize electrodes.

Factor 20
(plant, soil, plants, dry, root, --- concentrations, accumulation, matter, grown, environmental, culture, growth, production, total)

Focuses on the environmental impacts on plants & soils growth, concentrations, and production.

Factor 21
Tail [.318 to .148] (earth, rare, elements, XPS, heavy, photoelectron, ion, ions, trace, atomic, measured, Nd, compositions contents, metal)

Tail [-.267 to -.236] (equations, existence, solutions)

Focuses on the atomic interactions of heavy ions and photoelectrons of various elements such rare earth elements and metals using X-Ray Photoelectron Spectroscopy (XPS).

Factor 22
(stress, finite, numerical deformation, element, strain, solved, crack, elastic, shear, boundary)

Focuses on the physical properties of materials science used to characterize the effects of deformation such as stress, strain, cracks, elasticity, and boundaries.

Factor 23
(Fourier, transform, infrared, spectroscopy, FTIR, photoelectron, Raman, XPS, --- bonds, spectra, X-ray, bands, temperatures)

Focuses on spectroscopy techniques such as FTIR (Fourier Transform – InfraRed), XPS, and Raman spectroscopy .

Factor 24
(chromatography, column, separation, capillary, separated, buffer, liquid, pH, extraction, determination, purified)

Focuses on properties and uses of chromatography to separate mixtures of elements.

Factor 25
(NMR, H-1, elemental, IR, --- complexes, synthesized, spectra)

Focuses synthesizing Nuclear Magnetic Resonance (NMR) and IR imaging techniques.

Factor 26
(design, algorithm, simulation, control, system, systems, optimization, neural)

Focuses on algorithm design for simulations of control systems engineering using neural networks and optimization techniques.

Factor 27
(carcinoma, tumor, cell, cells, cancer, human, proliferation, staining, expression, apoptosis)

Focuses on cancer research for humans by studying the physiology of cancer cells and tumors.

Factor 28
(laser, optical, wave, Nd, output, wavelength, frequency, power, pulse, crystals, propagation, generation, crystal, width)

Focuses on physical properties used to characterize lasers using Nd crystals, such as optical properties, wavelengths, frequency, power, and pulse generation.

Factor 29
(regression, model, correlation, data, models, prediction, coefficient, coefficients, quantitative, linear, relationship)

Focuses on linear modeling techniques for regression, correlation, and prediction.

Factor 30
(polymerase, PCR, chain, gene, DNA, genetic, detected, reverse, genes, detect, reaction, RT-PCR, assay, controls)

Focuses on Polymerase Chain Reactions (PCR) and Reverse Transcription PCR (RT-PCR) used to detect DNA.

Factor 31
(dielectric, ceramics, sintering, ferroelectric, ceramic, --- electric constant, properties)

Focuses on the sintering and ferroelectric properties of dielectrics and ceramic materials.

Factor 32
(kinetics, kinetic, rate, reaction, equilibrium, constants, diffusion, reactions)

Focuses on Mechanic properties of physics such as kinetics, reactions, equilibrium and diffusion.

Factor 33
(pore, template, porous, diameter, aluminum, ordered, channels, adsorption, channel, area)

Focuses on the material properties of aluminum microstructures.

Factor 34
(rats, liver, tissue, aim, blood, groups, serum, group, vivo, treated, mice)

Focuses on in vivo physiology studies of livers, tissues, and blood of mice and rats.

Factor 35
(alloy, grain, alloys, microstructure, grains, deformation)

Focuses on microstructures of alloy materials to include their grains and deformation.

Factor 36
(microscopy, electron, transmission, scanning, diffraction, X-ray, TEM, microscope, photoelectron, SEM, spectroscopy, morphology)

Focuses on spectroscopic techniques such as X-ray Diffraction (XRD), Transmission Electron Microscopy (TEM) used in morphology studies.

Factor 37
(DSC, thermal, differential, crystallization, temperature, --- glass, scanning, melting, heating, temperatures, crystalline, transition)

Focuses on characterizing properties of crystallization and glass using Differential Scanning Calorimetry (DSC).

Factor 38
(image, algorithm, images, algorithms, accuracy, feature, recognition, technique, extraction, resolution)

Focuses on characterizing image processing algorithms feature recognition and extraction.

Factor 39
(field, magnetic, coupling, electric, spin, external, state, strong, dynamics, dependence, interaction, exchange, ferroelectric)

Focuses on the properties of nuclear physics.

Factor 40
(role, plays, models, simulations, processes, simulated defects, physical, structural, proteins, dynamics, molecular, genetic, model, cause, mechanism)

Focuses on modeling and simulations of the physical properties of proteins.

Table A6-1. Summary of Factor Matrix – Word Cluster Analysis (SCI, 40 Clusters)

Based On ==>	**FACTOR MATRIX (WORD)**
DATA SOURCE =>	**SCI INDEX**
# ITEMS ==>	**40 FACTORS**
CLUSTER #	**DESCRIPTION**
0	n/a

1	biological sciences of cell physiology, primarily using cells from rats.
2	physical properties of plasmas and gases related their flow and distribution.
3	atomic physics, specifically the interactions and bonding on atoms, molecules, ligands, crystals, primarily those of hydrogen and oxygen.
4	temporal (early and late) and location (middle, upper) divisions of regions and processes (eg. stages).
5	metric properties of detection such as limits, ranges, mathematical statistics, and sensitivities.
6	medical studies of humans for cancer research and potential causes and risk factors.
7	physical properties of composite materials.
8	genetic sequencing biology.
9	physical properties to define crystal structures.
10	synthesis and reactions of polymers, copolymers, and solvents.
11	growth, deposition, and thickness of thin films and substrates, primarily with the material Si.
12	properties of physical chemistry such as catalysts, oxidation, reactions, and reduction of CO.
13	molecular biology properties associated with mRNA such as binding, affinity, and purity.
14	study of microstructures such as nanoparticles, powders using techniques like X-ray diffraction, TEM, and sol-gel.
15	physical properties of spectroscopy such as emissions, spectra, absorption, fluorescence in the red, blue, and UV wavelength regions of the energy spectrum.
16	applied numerical mathematics of the chemistry of rare earth elements.
17	change in physical properties of material composition of grains due to changes in temperature.
18	physical properties of quantum physics theory associated with energy such as energy states, energy levels, bonding energy, energy densities, and excitation energies.
19	physical chemistry properties used to characterize electrodes.
20	environmental impacts on plants & soils growth, concentrations, and production.
21	atomic interactions of heavy ions and photoelectrons of various elements such rare earth elements and metals using X-Ray Photoelectron Spectroscopy (XPS).
22	physical properties of materials science used to characterize the effects of deformation such as stress, strain, cracks, elasticity, and boundaries.
23	spectroscopy techniques such as FTIR (Fourier Transform – InfraRed), XPS, and Raman spectroscopy .
24	properties and uses of chromatography to separate mixtures of elements.
25	synthesizing Nuclear Magnetic Resonance (NMR) and IR imaging techniques.
26	algorithm design for simulations of control systems engineering using neural networks and optimization techniques.
27	cancer research for humans by studying the physiology of cancer cells and tumors.
28	physical properties used to characterize lasers using Nd crystals, such as optical properties, wavelengths, frequency, power, and pulse generation.
29	linear modeling techniques for regression, correlation, and prediction.
30	Polymerase Chain Reactions (PCR) and Reverse Transcription PCR (RT-PCR) used to detect DNA.
31	sintering and ferroelectric properties of dielectrics and ceramic materials.
32	Mechanic properties of physics such as kinetics, reactions, equilibrium and diffusion.

33	material properties of aluminum microstructures.
34	vivo physiology studies of livers, tissues, and blood of mice and rats.
35	microstructures of alloy materials to include their grains and deformation.
36	spectroscopic techniques such as X-ray Diffraction (XRD), Transmission Electron Microscopy (TEM) used in morphology studies.
37	characterizing properties of crystallization and glass using Differential Scanning Calorimetry (DSC).
38	characterizing image processing algorithms feature recognition and extraction.
39	properties of nuclear physics.
40	modeling and simulations of the physical properties of proteins.

Appendix 7 – Phrase Factor Themes (SCI Index, 40 Factors)

The same format as in Appendix 6 was used in this Appendix. The main difference is that phrases were used for the present analysis. Table A7-1 (below) contains a summary of the factor descriptions.

Factor 1
(Z, D-c, beta, C, crystal structure, M-r, monoclinic system, gamma, R-1)

Focuses on the physical properties to define crystal structures.

Factor 2
(Bcl-2, Bax, apoptosis, caspase-3, cytosol, molecular mechanism, --- treatment, cleavage, mitochondria, p53, activation, cell proliferation, induction)

Focuses on the gene onotolgy of Bcl-2 associated X-proteins (BAX) and caspase-3 genes.

Factor 3
(Gd, Sm, Pr, La, Nd, ER, Tb, --- HO, Eu, Curie Temperature, H-1 NMR spectra)

Focuses on the elemental materials (Gd, Sm, Pr, La, Nd, ER, Tb, HO, Eu) identified in proton - Nuclear Magnetic Resonance (H-1 NMR) spectra.

Factor 4
(catalyst, catalysts, catalytic activity, selectivity, reaction conditions, catalytic properties, high activity, --- reaction, propylene, H2O2, activity)

Focuses on physical chemistry properties such as catalysts, oxidation, reactions, and activities of propylene and H2O2.

Factor 5
(Raman spectroscopy, Rutherford, laser deposition, films, spectroscopy, X-ray photoelectron spectroscopy, carbon, Fourier, substrates)

Focuses on the spectroscopic techniques such as Raman spectroscopy, X-ray photoelectron spectroscopy (XPS), and Fourier Transforms that exploit Rutherford scattering to characterize laser deposition of films and substrates that contain carbon.

Factor 6
(PP, polypropylene PP, blends, differential, calorimetry DSC, crystallinity, fibers, DSC, crystallization, morphology)

Focuses on changes in morphology and crystallization between different blends of Polypropylene (PP) fibers.

Factor 7

(heart, liver, kidney, lung, brain, --- tissues, rats, blood, testis, mice)

Focuses on physiology studies of organs (heart, liver, kidney, lung, brain, testis), blood and tissues of rats and mice.

Factor 8
(patients, methods, background, diagnosis, symptoms, specificity, disease, treatment, P)

Focuses on correlating backgrounds of patients and methods to identify specific symptoms with the appropriate disease diagnosis of diseases and treatments for the patients.

Factor 9
(isomers, energies, reactants, electronic structures, MP2, potential energy surface, ab initio calculations, CH3, vibrational frequencies, CL, calculation, dissociation, frequencies, energy, electronic structure)

Focuses on characterizing the physical properties of isomers.

Factor 10
(mechanical properties, fracture toughness, flexural strength, composites, tensile strength)

Focuses on the mechanical properties and strengths of composite materials.

Factor 11
Tail [-.583 to -.154] (R-gt(F, wR(ref)(F-2, beta, Z, gamma, C, alpha, crystal data, R-1)

Tail [.429 to .228] (photocatalytic activity, anatase, rutile, sol-gel method, TiO2, specific surface area, particle size)

Focuses on the physical properties of TiO2 particles.

Factor 12
(detection limit, linear range, sensor, oxidation, Na, hydrogen peroxide, Li, detection limits)

Focuses on the detection characteristics of sensors using Na, Li, hydrogen peroxide, such as limits, linear range, and oxidation.

Factor 13
(IL-6, TNF-alpha, LPS, --- ELISA, rats, dose-dependent manner, cells, activation, RT-PCR, production)

Focuses on study of cells and proteins of rats (IL-6, Tumor Necrosis Factor-alpha (TNF-alpha), and LPS).

Factor 14
(IR, elemental analyses, elemental analysis, H-1 NMR, UV, H-1 NMR spectra)

Focuses elemental analysis by synthesizing Nuclear Magnetic Resonance (NMR) and IR imaging techniques.

Factor 15
(wear resistance, wear, atomic force microscopy AFM, surface morphology, coatings, films, coating)

Focuses on the characterization of wear resistance and surface morphology of coatings and films using atomic force microscopy (AFM).

Factor 16
(cytoplasm, protein, situ hybridization, nucleus, transgenic plants, genome, gene, immunohistochemistry, RT-PCR, antibodies, cDNA, tobacco, molecular mass, virus, Escherichia coli, genomic DNA, infection, PCR, western blot)

Focuses on the study of genetic defects in cells and proteins resulting from tobacco use based on assessment techniques such as immunohistochemistry and RT-PCR.

Factor 17
(dielectric constant, dielectric properties, dielectric loss, temperature dependence, temperature, ceramics, dielectric, temperature range, room temperature, sol-gel process, ferroelectric properties, Curie temperature)

Focuses on the characterization of the material properties of dielectrics and ceramics.

Factor 18
(carbon dioxide, methane, alcohols, ethanol, acetic acid, methanol, flow rate, ammonia, mobile phase)

Focuses on the study of fuels such as methane, alcohols, ethanol, acetic acid, methanol, and ammonia which includes their release of carbon dioxide and flow rates.

Factor 19
(D-c, Z, beta, M-r, C, crystal structure, space group P 1, cell parameters, gamma)

Focuses on properties used to define crystal structures.

Factor 20
(Zn, Mn, Cu, Ni, Pb, CR, elements, Mg, Ti, CO, Cd)

Focuses on studies involving the following Transition Metal elements; Zn, Mn, Cu, Ni, Pb, CR, Mg, Ti, CO, and Cd.

Factor 21
(morphology, nanowires, diameter, transmission electron microscopy TEM, --- aluminum, transmission electron microscopy, nanotubes, pores, X-ray diffraction, silver)

Focuses on characterizing the morphology of aluminum and silver material nanowires using transmission electron microscopy (TEM) and X-ray Diffraction (XRD) techniques.

Factor 22
(R-gt(F, wR(ref)F-2, photocatalytic activity, anatase, beta, --- Z, TiO2, sol-gel method, specific surface area, rutile, C, gamma, particle size, alpha)

Focuses on the physical properties of TiO2 particles.

Factor 23
(N-2, O-2, oxides, H-2, CuO, TPR, atmosphere, CH4, Ar, NiO)

Focuses on the elements used in Temperature Programmed Reduction/Reaction (TPR) experiments, such as Nitrogen, Oxygen, oxides (eg. Copper & Nitrous Oxide), Hydrogen, CH4, and Argon.

Factor 24
(HCC, hepatocellular carcinoma HCC, gene expression, tumors, metastasis, molecular mechanism, cell proliferation, tumor)

Focuses on physiology of cells and genes and their effects on hepatocellular carcinoma (HCC).

Factor 25
(plants, soil, concentrations, toxicity, root, germination, treatments, soils, plant, wheat)

Focuses on plant (eg. wheat) and soil toxicity studies and their effects on roots, germination and related treatments.

Factor 26
(differential, Fourier, calorimetry, calorimetry DSC, thermogravimetric analysis, infrared spectroscopy, thermal stability, optical microscopy, infrared FTIR spectroscopy, C-13 NMR)

Focuses on spectroscopic techniques used to characterize thermal stability. These include: Differential Scanning Calorimetry (DSC), Fourier Transfor Infra Red (FTIR), Themogravimetric Analysis (TGA), and C-13 Nuclear Magnetic Resonnance (NMR).

Factor 27
(sensitivity, specificity, high sensitivity, detection, antibodies, mobile phase, separation, urine, flow rate, antibody, antigen, accuracy, assay, serum samples, serum)

Focuses on the detection properties used in assaying antibodies, antigens, serums, and urine which include sensitivity, specificity, mobile phase, flow rates, accuracy, and separation capabilities.

Factor 28
(XRD, TEM, XPS, FR-IR, TPR, SEM, BET, FTIR)

Focuses on spectroscopy techniques such as X-ray Diffraction (XRD), Tomographic Electron Microscopy (TEM), XPS, SEM, BET, FR-IR, and FTIR.

Factor 29
(females, males, sexes, age, weight, animals, gestation, death, sex, specimens)

Focuses on the lifespan of animals based sex and weight.

Factor 30
(smoking, men, women, gender, risk factors, tobacco, increased risk, age, pregnancy)

Focuses on the risks to humans of smoking tobacco based on gender, age and pregnancy.

Factor 31
(Ba, Mo, SR, organisms, W, Eu, Na, HF, precursors, CR, Au)

Focuses primarily on transition metals (Mo, W, Na, HF, CR, Au) and organisms used as precursors.

Factor 32
Tail [-.323 to -.214] (detection limit, electrochemical behavior, cyclic voltammetry, linear range, gold electrode, modified electrode, concentration, electrode)

Tail [.203 to .161] (XRD results, ZnO, regeneration, sulfur)

Focuses on characterizing the electrochemical behavior of electrodes (gold and ZnO) using XRD.

Factor 33
(zinc, iron, copper, calcium, nickel, absorbance)

Focuses on absorbance properties of metals, such as zinc, iron, copper, nickel, and calcium.

Factor 34
(E. coli, bacteria, Escherichia coli, chitosan, supernatant, enzyme, PCR, molecular weight, FTIR, NMR, pH values, protein, precipitation, purification, HPLC, copolymer, MS, H2O2, western blot, solid)

Focuses on determining the presence of E. coli and bacteria in chitosan, supernatants, enzymes, proteins, and copolymers using techniques such as PCR, FTIR, and NMR.

Factor 35
(alloy, microstructure, grains, microstructures, transmission electron microscopy TEM, grain boundaries, electron microscopy SEM, annealing, grain boundary, grain size)

Focuses on characterizing the properties and microstructures of alloys, such as grains, grain boundaries, and grain size using TEM and SEM techniques.

Factor 36
Tail [-.24 to -.16] (X-ray photoelectron spectroscopy XPS, hydrolysis, infrared FTIR spectroscopy, transmission electron microscopy TEM, Fourier, TEM images, X-ray powder diffraction XRD)

Tail [.235 to .164] (H-2, methane, CH4)

Focuses on spectroscopic techniques such as XPS, FTIR, TEM, and XRD to characterize the hydrolysis of elements such as hydrogen and methane.

Factor 37
(resistivity, films, atomic force microscopy, surface roughness, hardness, roughness, electrical properties, surface morphology)

Focuses on characterizing the material properties of films and surfaces using atomic force microscopy (AFM).

Factor 38
(inhibition, inhibitory effect, cytotoxicity, compounds, cells, vitro, inhibitors, biological activity, mice, activity, nitric oxide, inhibitory effects, inflammation, vivo, immunohistochemical staining, cell proliferation, supernatant, assay)

Focuses on both in vivo and in vitro physiology studies of mice cells to characterize the effects of inhibitors and cytotoxicity on cell proliferation using immunohistochemical staining techniques.

Factor 39
(TGA, DSC, swelling, NMR, Chemical Industry, --- glass transition temperature, IR, membranes, hydrogels)

Focuses on TGA, DSC, and NMR techniques to characterizes swelling of glass, membranes, and hydrogels used in the Chemical Industry.

Factor 40
(holes, lattice, recombination, hole, CuO, electron, surface modification)

Focuses on material composition of solid state surfaces using CuO.

Table A7-1. Summary of Factor Matrix – Phrase Analysis (SCI, 40 clusters)

Based On ==>	**FACTOR MATRIX (PHRASE)**
DATA SOURCE =>	**SCI INDEX**
# ITEMS ==>	**40 FACTORS**
CLUSTER #	**DESCRIPTION**
0	n/a
1	physical properties to define crystal structures.
2	gene onotolgy of Bcl-2 associated X-proteins (BAX) and caspase-3 genes.
3	elemental materials (Gd, Sm, Pr, La, Nd, ER, Tb, HO, Eu) identified in proton - Nuclear Magnetic Resonance (H-1 NMR) spectra.
4	physical chemistry properties such as catalysts, oxidation, reactions, and activities of propylene and H2O2.
5	spectroscopic techniques such as Raman spectroscopy, X-ray photoelectron spectroscopy (XPS), and Fourier Transforms that exploit Rutherford scattering to characterize laser deposition of films and substrates that contain carbon.
6	morphology and crystallization between different blends of Polypropylene (PP) fibers.
7	physiology studies of organs (heart, liver, kidney, lung, brain, testis), blood and tissues of rats and mice.
8	correlating backgrounds of patients and methods to identify specific symptoms with the appropriate disease diagnosis of diseases and treatments for the patients.
9	characterizing the physical properties of isomers.
10	mechanical properties and strengths of composite materials.
11	physical properties of TiO2 particles.
12	detection characteristics of sensors using Na, Li, hydrogen peroxide, such as limits, linear range, and oxidation.
13	study of cells and proteins of rats (IL-6, Tumor Necrosis Factor-alpha (TNF-alpha), and LPS).
14	elemental analysis by synthesizing Nuclear Magnetic Resonance (NMR) and IR imaging techniques.
15	characterization of wear resistance and surface morphology of coatings and films using atomic force microscopy (AFM).
16	study of genetic defects in cells and proteins resulting from tobacco use based on assessment techniques such as immunohistochemistry and RT-PCR.
17	characterization of the material properties of dielectrics and ceramics.
18	study of fuels such as methane, alcohols, ethanol, acetic acid, methanol, and ammonia which includes their release of carbon dioxide and flow rates.
19	properties used to define crystal structures.
20	studies involving the following Transition Metal elements; Zn, Mn, Cu, Ni, Pb, CR, Mg, Ti, CO, and Cd.
21	characterizing the morphology of aluminum and silver material nanowires using transmission electron microscopy (TEM) and X-ray Diffraction (XRD) techniques.
22	physical properties of TiO2 particles.

23	elements used in Temperature Programmed Reduction/Reaction (TPR) experiments, such as Nitrogen, Oxygen, oxides (eg. Copper & Nitrous Oxide), Hydrogen, CH4, and Argon.
24	physiology of cells and genes and their effects on hepatocellular carcinoma (HCC).
25	plant (eg. wheat) and soil toxicity studies and their effects on roots, germination and related treatments.
26	spectroscopic techniques used to characterize thermal stability. These include: Differential Scanning Calorimetry (DSC), Fourier Transfor Infra Red (FTIR), Themogravimetric Analysis (TGA), and C-13 Nuclear Magnetic Resonnance (NMR).
27	detection properties used in assaying antibodies, antigens, serums, and urine which include sensitivity, specificity, mobile phase, flow rates, accuracy, and separation capabilities.
28	spectroscopy techniques such as X-ray Diffraction (XRD), Tomographic Electron Microscopy (TEM), XPS, SEM, BET, FR-IR, and FTIR.
29	lifespan of animals based sex and weight.
30	risks to humans of smoking tobacco based on gender, age and pregnancy.
31	primarily on transition metals (Mo, W, Na, HF, CR, Au) and organisms used as precursors.
32	characterizing the electrochemical behavior of electrodes (gold and ZnO) using XRD.
33	absorbance properties of metals, such as zinc, iron, copper, nickel, and calcium.
34	determining the presence of E. coli and bacteria in chitosan, supernatants, enzymes, proteins, and copolymers using techniques such as PCR, FTIR, and NMR.
35	characterizing the properties and microstructures of alloys, such as grains, grain boundaries, and grain size using TEM and SEM techniques.
36	spectroscopic techniques such as XPS, FTIR, TEM, and XRD to characterize the hydrolysis of elements such as hydrogen and methane.
37	characterizing the material properties of films and surfaces using atomic force microscopy (AFM).
38	both in vivo and in vitro physiology studies of mice cells to characterize the effects of inhibitors and cytotoxicity on cell proliferation using immunohistochemical staining techniques.
39	TGA, DSC, and NMR techniques to characterizes swelling of glass, membranes, and hydrogels used in the Chemical Industry.
40	material composition of solid state surfaces using CuO.

Appendix 8A MultiLink – Word Dendogram
-Science Citation Index
-2002 Database

A word frequency analysis was performed on the Abstracts from the 2002 SCI database. The highest frequency high technical content words were selected, and a co-occurrence matrix was generated. It was normalized using the mutual information index. Word clustering was generated using the WINSTAT statistical package, and the following dendrogram was produced. Figure A8A-1 below shows the entire dendogram. Figure A8A-2 shows the entire dendogram in a larger readable version in pieces over the following 5 pages. This dendrogram was the basis for the taxonomy used in the text, and shown in detail in Appendix 8B.

Figure A8A-1 Entire MultiLink - Word Dendogram (small scale)

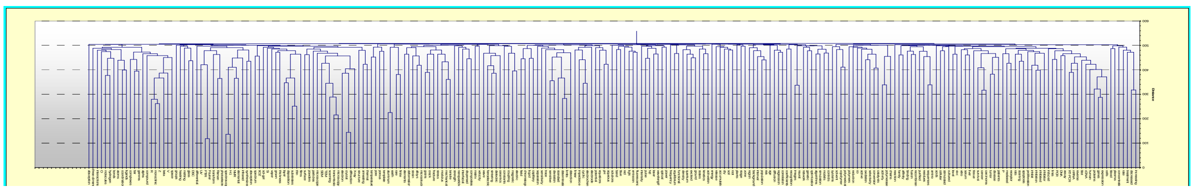
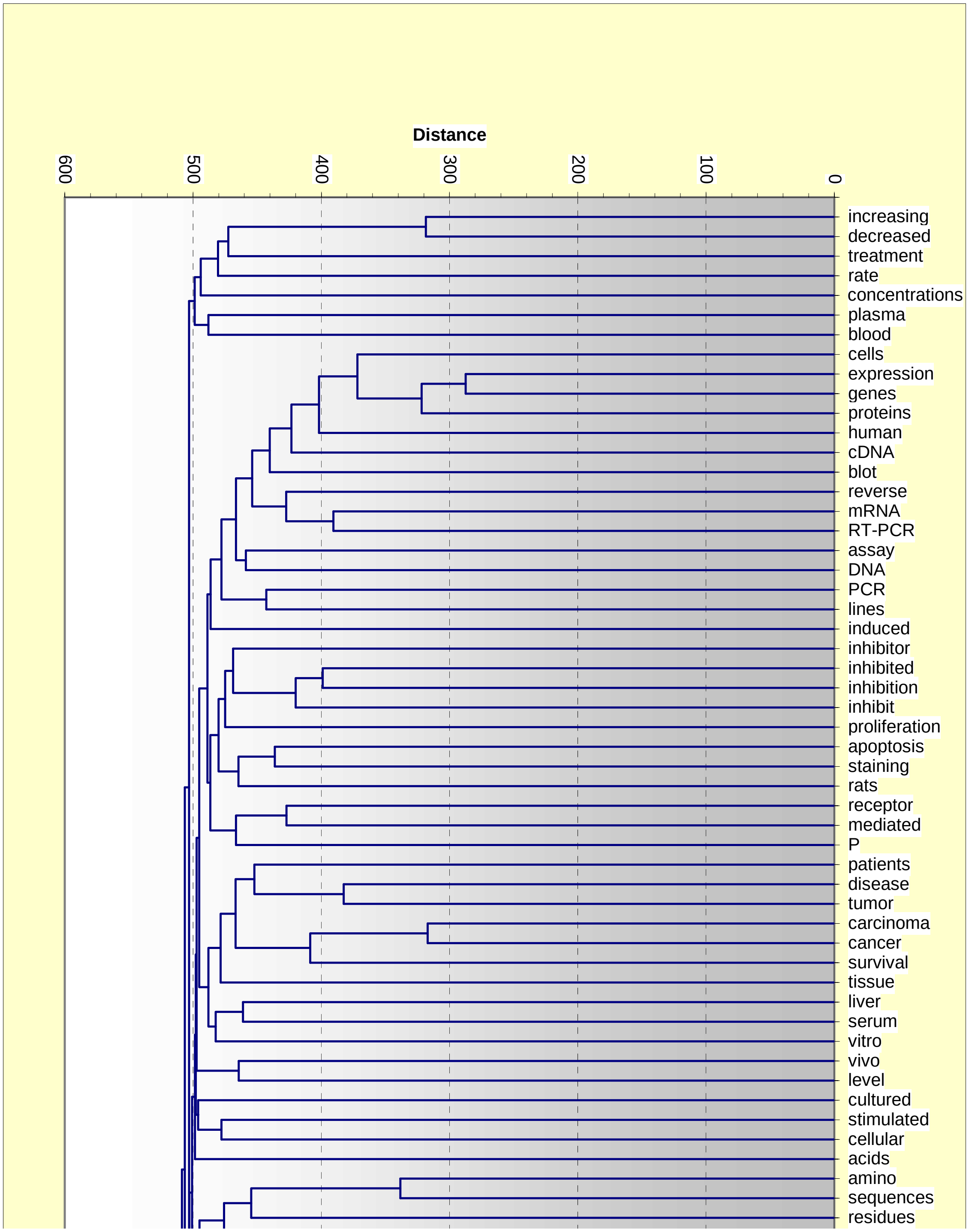
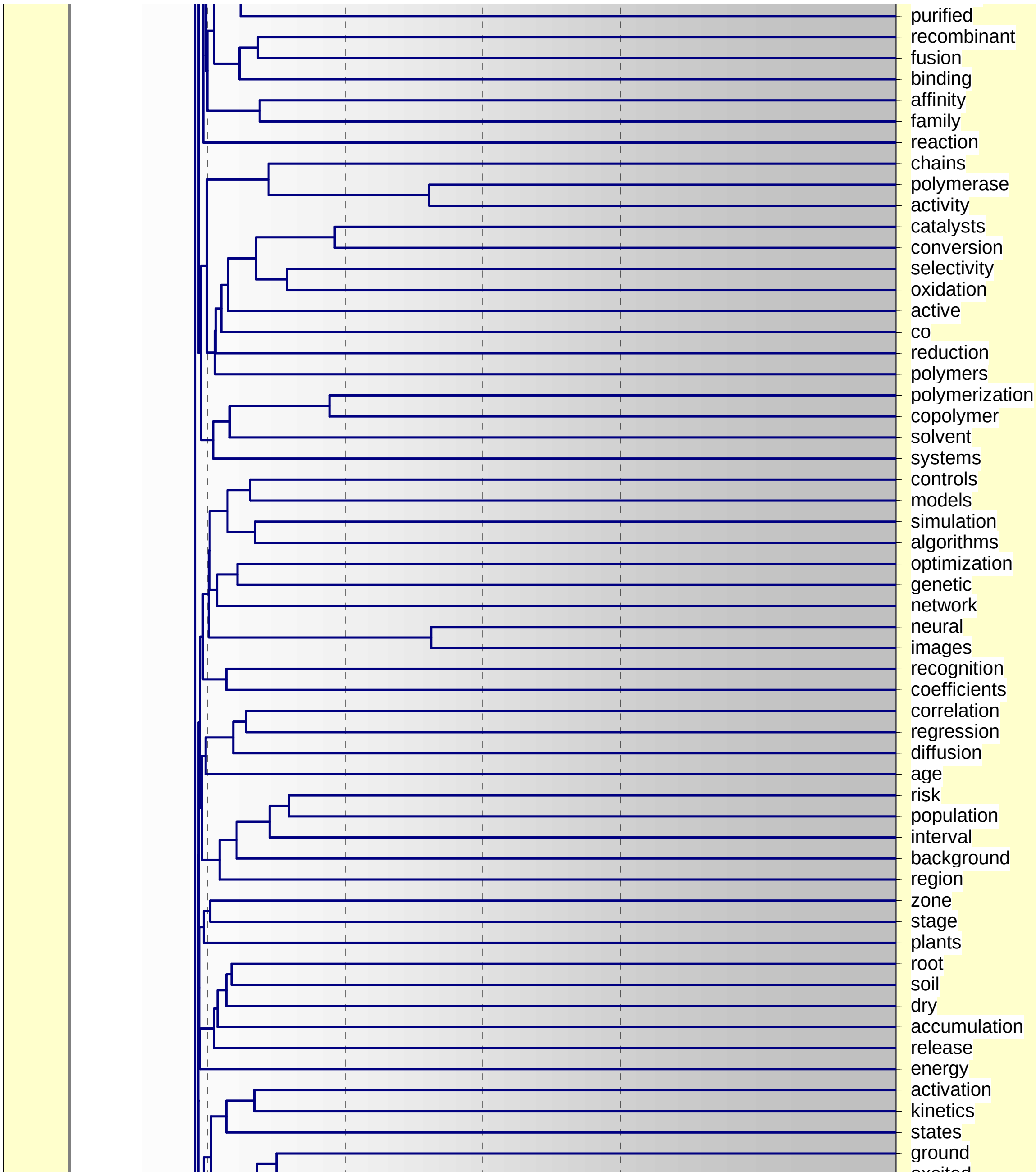
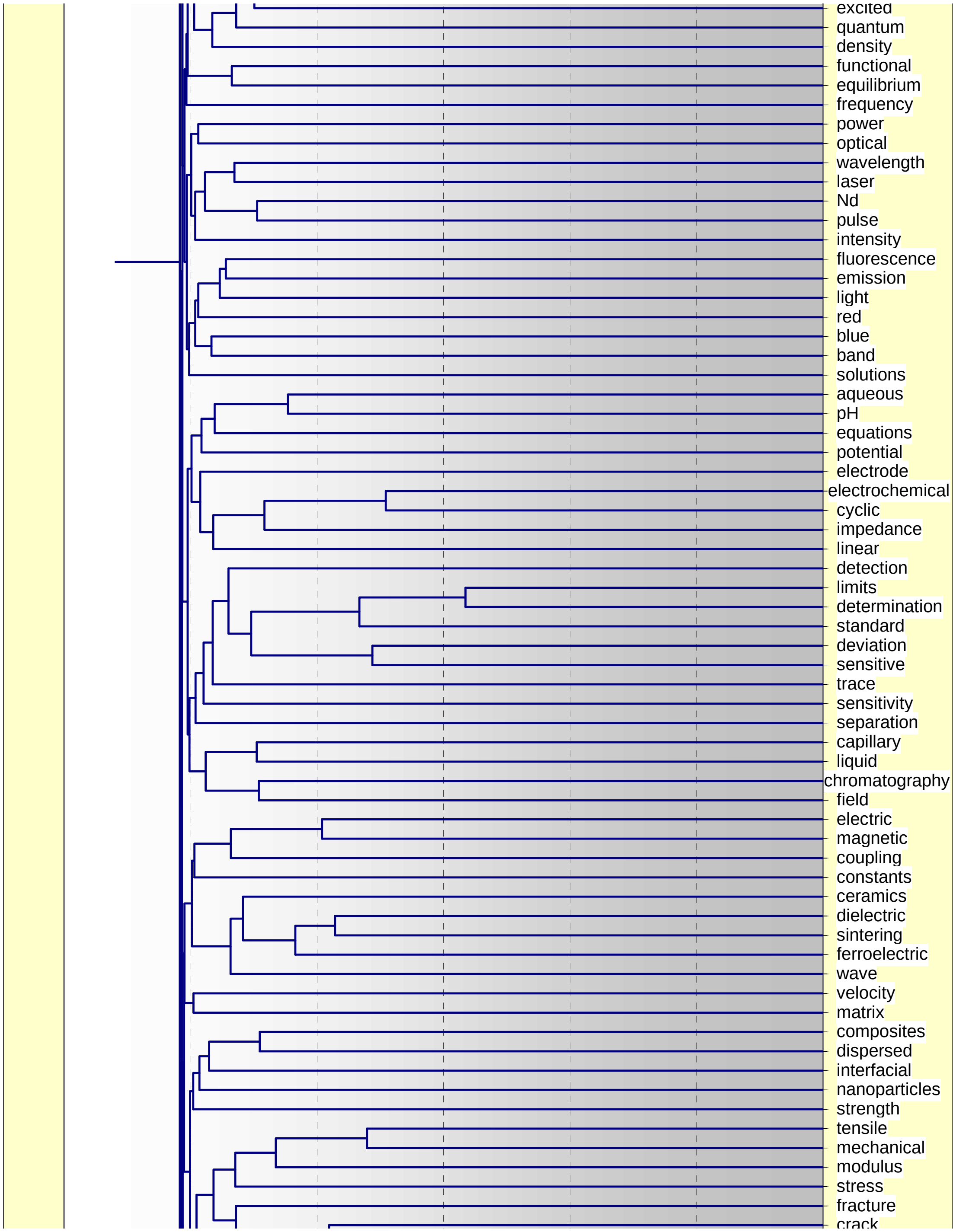
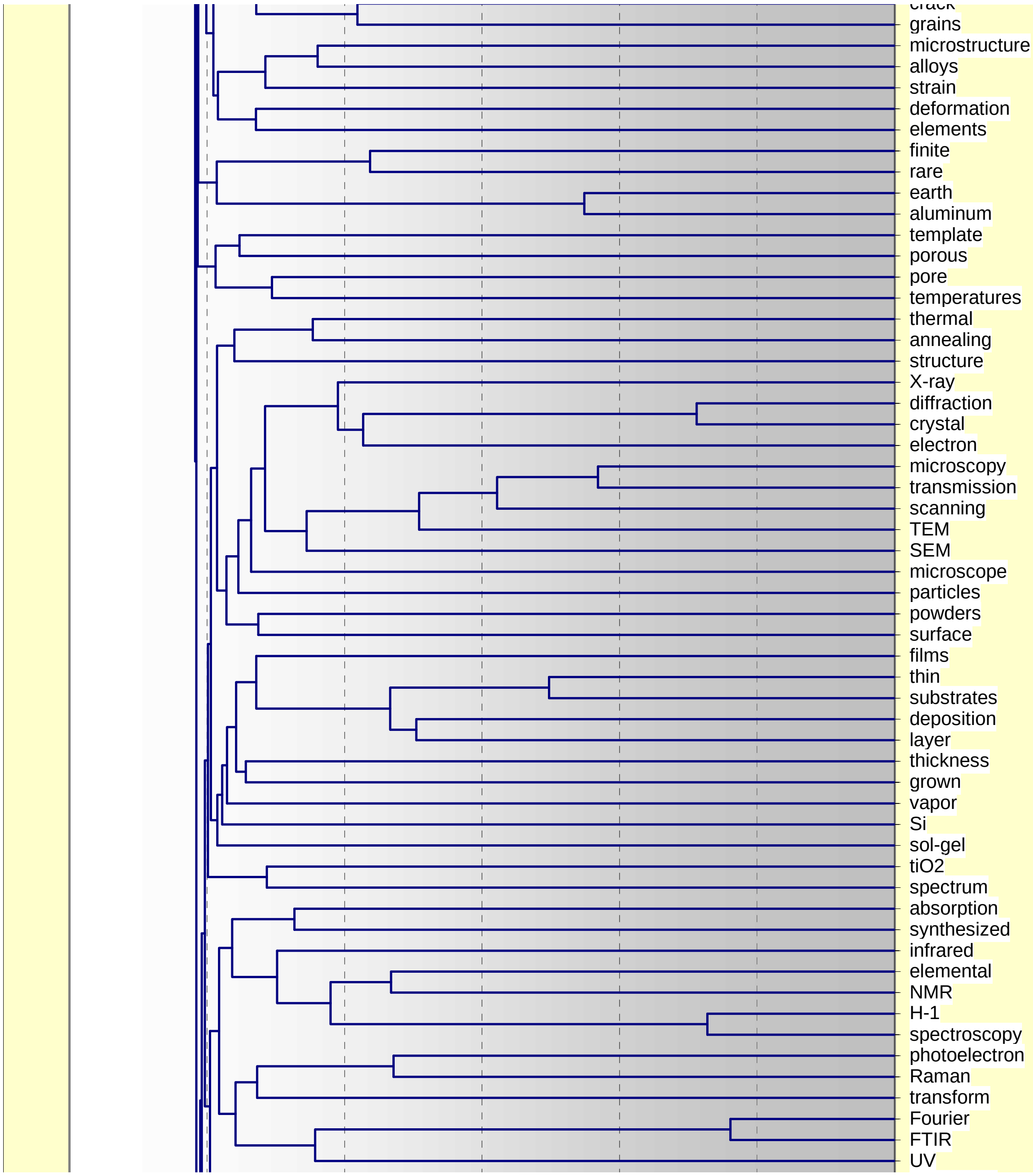


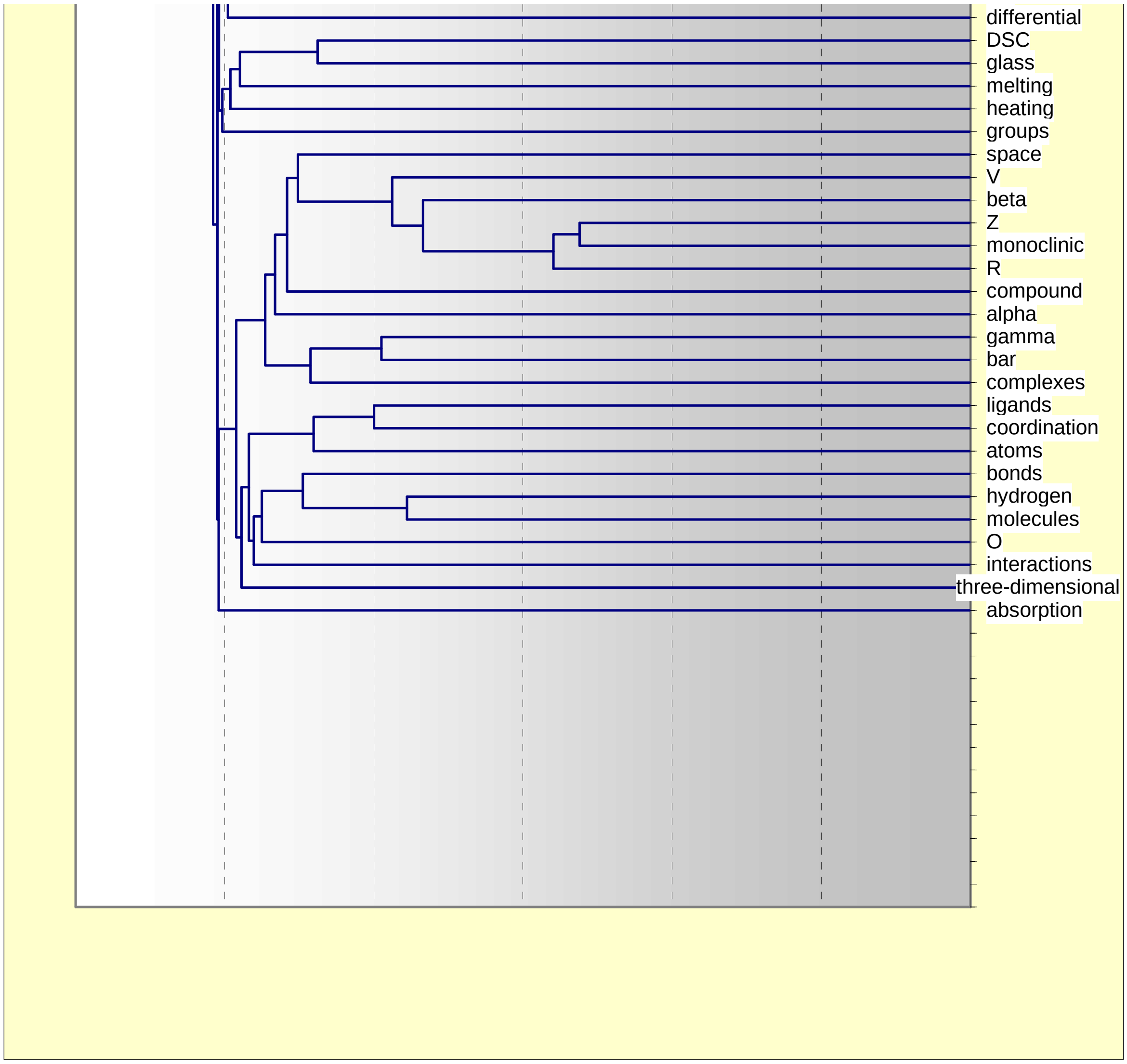
Figure A8A-2. Entire MultiLink - Word Dendogram (large scale)
-- shown in following 5 pages


Distance
600
500
400
300
200
100
0
increasing
decreased
treatment
rate
concentrations
plasma
blood
cells
expression
genes
proteins
human
cDNA
blot
reverse
mRNA
RT-PCR
assay
DNA
PCR
lines
induced
inhibitor
inhibited
inhibition
inhibit
proliferation
apoptosis
staining
rats
receptor
mediated
P
patients
disease
tumor
carcinoma
cancer
survival
tissue
liver
serum
vitro
vivo
level
cultured
stimulated
cellular
acids
amino
sequences
residues


purified
recombinant
fusion
binding
affinity
family
reaction
chains
polymerase
activity
catalysts
conversion
selectivity
oxidation
active
co
reduction
polymers
polymerization
copolymer
solvent
systems
controls
models
simulation
algorithms
optimization
genetic
network
neural
images
recognition
coefficients
correlation
regression
diffusion
age
risk
population
interval
background
region
zone
stage
plants
root
soil
dry
accumulation
release
energy
activation
kinetics
states
ground


excited
quantum
density
functional
equilibrium
frequency
power
optical
wavelength
laser
Nd
pulse
intensity
fluorescence
emission
light
red
blue
band
solutions
aqueous
pH
equations
potential
electrode
electrochemical
cyclic
impedance
linear
detection
limits
determination
standard
deviation
sensitive
trace
sensitivity
separation
capillary
liquid
chromatography
field
electric
magnetic
coupling
constants
ceramics
dielectric
sintering
ferroelectric
wave
velocity
matrix
composites
dispersed
interfacial
nanoparticles
strength
tensile
mechanical
modulus
stress
fracture
crack


crack
grains
microstructure
alloys
strain
deformation
elements
finite
rare
earth
aluminum
template
porous
pore
temperatures
thermal
annealing
structure
X-ray
diffraction
crystal
electron
microscopy
transmission
scanning
TEM
SEM
microscope
particles
powders
surface
films
thin
substrates
deposition
layer
thickness
grown
vapor
Si
sol-gel
tiO2
spectrum
absorption
synthesized
infrared
elemental
NMR
H-1
spectroscopy
photoelectron
Raman
transform
Fourier
FTIR
UV


differential
DSC
glass
melting
heating
groups
space
V
beta
Z
monoclinic
R
compound
alpha
gamma
bar
complexes
ligands
coordination
atoms
bonds
hydrogen
molecules
O
interactions
three-dimensional
absorption

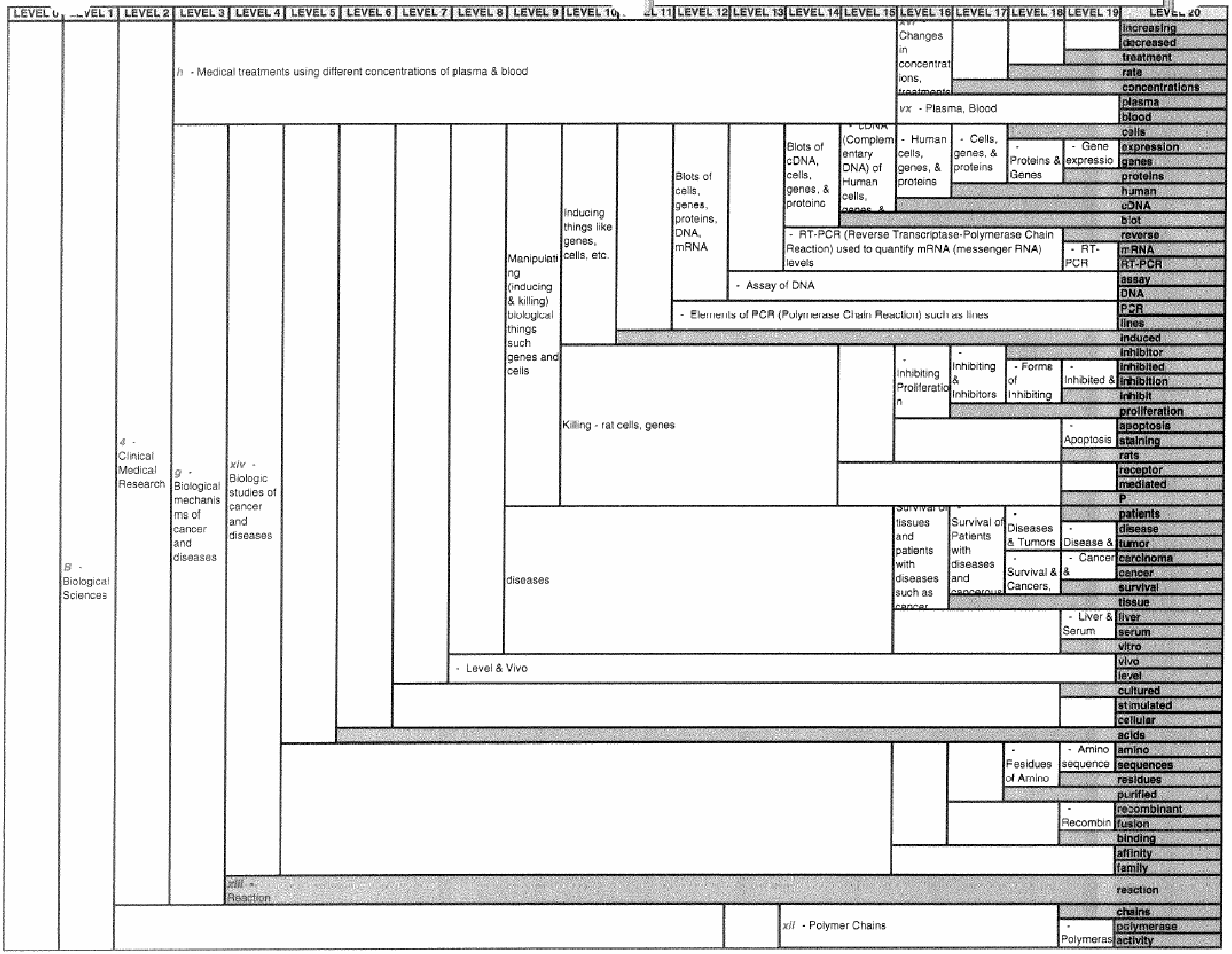
Appendix 8B MultiLink – Word Taxonomy (SCI)
-Science Citation Index
-2002 Database

This is the taxonomy that resulted from the dendrogram in Appendix 8A. Figure A8B-1 (also Figure 3 in the text) shows the top-level taxonomy (Levels 0-4).

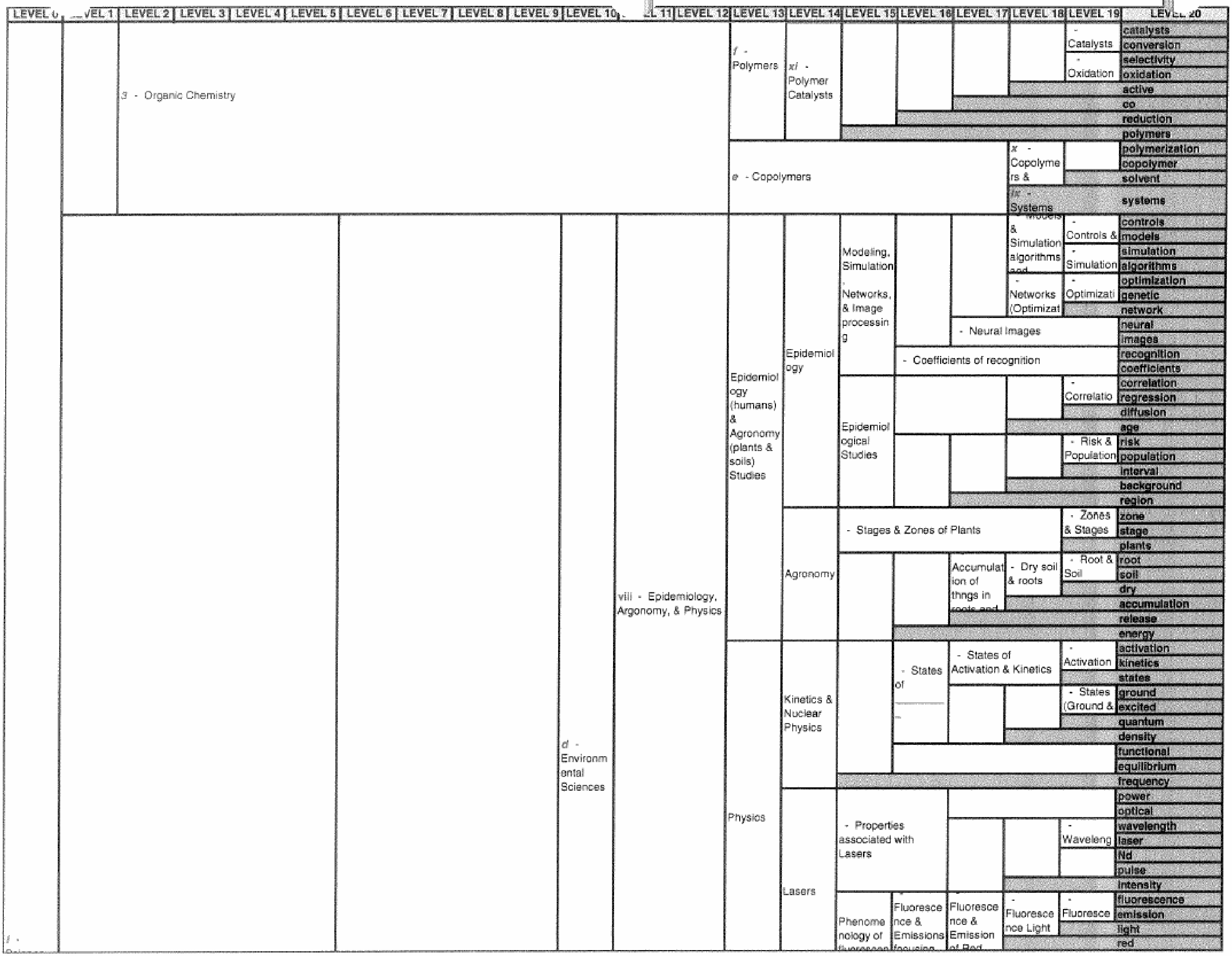
Figure A8B-1. Multi-link Word Taxonomy (SCI, Levels 0-4)

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
Science (Biological, Environmental, & Material)	Biological Sciences	Clinical Medical Research	Medical treatments using different concentrations of plasma & blood	Changes in Concentrations, Treatments & Rates
				Blood & Plasma
			Biological mechanisms of cancer and diseases	Biologic studies of cancer and diseases
				Reactions
		Organic Chemistry	Polymers	Polymer Chains
				Polymer Catalysts
			Copolymers	Copolymer & Solvents
				Systems
	Environmental & Material Sciences	Environmental Sciences & Material Science (Ceramic Composites & Nanoparticles)	Environmental Sciences	Epidemiology, Agronomy, & Physics
				Detection & Characterization of Trace amounts of substances
			Ceramic Composites & Nanoparticles	Properties of ceramic composites, nanoparticles, & alloy microstructures
				Porous templates & pore temperatures
		Material Science (Powders, Thin Films, Substrates, & Glass)	Powders, Thin Films, Substrates, & Glass	Characterization of Powders, Thin Films, and Substrates
				Characterization of Glass
			Inorganic Chemistry	Chemistry of atoms, molecules, ligands, & compounds
				Absorption

Figure A8B-2. Multi-link Word Taxonomy (SCI, All Levels)


LEVEL 0
LEVEL 1
LEVEL 2
LEVEL 3
LEVEL 4
LEVEL 5
LEVEL 6
LEVEL 7
LEVEL 8
LEVEL 9
LEVEL 10
LEVEL 11
LEVEL 12
LEVEL 13
LEVEL 14
LEVEL 15
LEVEL 16
LEVEL 17
LEVEL 18
LEVEL 19
LEVEL 20
B - Biological Sciences
4 - Clinical Medical Research
g - Biological mechanisms of cancer and diseases
xiv - Biologic studies of cancer and diseases
xiii - Reaction
h - Medical treatments using different concentrations of plasma & blood
Changes in concentrations, treatments
vx - Plasma, Blood
Manipulating (inducing & killing) biological things such genes and cells
Inducing things like genes, cells, etc.
Blots of cells, genes, proteins, DNA, mRNA
Blots of cDNA, cells, genes, & proteins
- cDNA (Complementary DNA) of Human cells, genes &
- Human cells, genes, & proteins
- Cells, genes, & proteins
- Proteins & Genes
- Gene expressio
- RT-PCR (Reverse Transcriptase-Polymerase Chain Reaction) used to quantify mRNA (messenger RNA) levels
- RT-PCR
- Assay of DNA
- Elements of PCR (Polymerase Chain Reaction) such as lines
Killing - rat cells, genes
- Inhibiting Proliferation
- Inhibiting & Inhibitors
- Forms of Inhibiting
- Inhibited &
- Apoptosis
diseases
Survival of tissues and patients with diseases such as cancer
- Survival of Patients with diseases and cancerous
- Diseases & Tumors
- Survival & Cancers,
- Disease &
- Cancer &
- Liver & Serum
- Level & Vivo
- Residues of Amino
- Amino sequence
- Recombin
xii - Polymer Chains
- Polymeras
increasing
decreased
treatment
rate
concentrations
plasma
blood
cells
expression
genes
proteins
human
cDNA
blot
reverse
mRNA
RT-PCR
assay
DNA
PCR
lines
induced
inhibitor
inhibited
inhibition
inhibit
proliferation
apoptosis
staining
rats
receptor
mediated
P
patients
disease
tumor
carcinoma
cancer
survival
tissue
liver
serum
vitro
vivo
level
cultured
stimulated
cellular
acids
amino
sequences
residues
purified
recombinant
fusion
binding
affinity
family
reaction
chains
polymerase
activity

Multi-Li... (SCI)



Attachment 1 - APPENDIX A8B-2 - MULTILINK - WORD TAXONOMY (SC All Levels) 2/5 Printed -- 12/22/2005 1:52 PM

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8	LEVEL 9	LEVEL 10	LEVEL 11	LEVEL 12	LEVEL 13	LEVEL 14	LEVEL 15	LEVEL 16	LEVEL 17	LEVEL 18	LEVEL 19	LEVEL 20
Science (Biological, Physical, & Material)															ce & light	on the Red &	- Blue band			blue
																				band
																				solutions
						2 - Environmental Sciences & Material Science (Ceramic Composites & Nanoparticles)												- Aqueous & pH	- Aqueous	aqueous
																				pH
																				equations
												Physical Chemistry of Electrodes & Solutions								potential
																				electrode
																	- (Cyclic &) Linear impedance of electroche	- Electrochemical &	- Electroche	electrochemical
											vii - Detection & Characterization of Trace amounts of substances									cyclic
																				impedance
																				linear
																				detection
												Using liquid chromatography to detect trace amounts within standard deviations	Separation & Detection sensitivities	Sensitivities of detecting trace amounts of substances	- Detection of trace amounts of substances	- Detection & Statistics	- Statistics		- Determina	limits
																				determination
																				standard
																		- Sensitive deviations		deviation
																				sensitive
																				trace
																				sensitivity
																				separation
																			- Capillary	capillary
													Liquid Chromatography							liquid
																			- Field Chromato	chromatography
																				field
														Property elements associated with Ceramic materials (e.g. dielectric, ferroelectric, sintering, electro-		- Electro-magnetic coupling		- Electric & Magnetic	- Electric &	electric
																				magnetic
																				coupling
																				constants
																				ceramics
																	Sintering of dielectrics	- Sintering of	- Dielectric	dielectric
																				sintering
																				ferroelectric
																				wave
																				velocity
																				matrix
												vi - Properties of ceramic composites, nanoparticles, & alloy microstructures			- Strength of Nanoparticles & Composites				- Dispersed	composites
																				dispersed
																				interfacial
	A - Physical & Material Sciences																			nanoparticles
														- Strength properties of Nanoparticles, Composites, Grains, & Alloy Microstructures						strength
																	- Stress Modulus related with tensile &			tensile
										c - Ceramic Composites & Nanoparticles					- Stress, Strain, & Fracture of grains and alloy microstructures	- Stress & Fracture properties of Grains				mechanical
																				modulus
																				stress
																	- Fractures & Cracks of Grains			fracture
																			- Cracks & Grains	crack
																				grains
																- Elemental deformation & strain of alloy microstructures		- Strain in microstruc	- Microstruc	microstructure
																				alloys
																				strain
																		- Elements of deformation		deformation
																				elements
													- Rare Earth, ______						- Finite & Rare	finite
																				rare
																			- Earth &	earth
																				aluminum
												v - Porous templates & pore temperatures							- Porous templates	template
																				porous
																			- Pore temperatu	pore
																				temperatures
												- Thermal annealing of structures							- Thermal	thermal
																				annealing

LEVEL 0 | LEVEL 1 | LEVEL 2 | LEVEL 3 | LEVEL 4 | LEVEL 5 | LEVEL 6 | LEVEL 7 | LEVEL 8 | LEVEL 9 | LEVEL 10 | LEVEL 11 | LEVEL 12 | LEVEL 13 | LEVEL 14 | LEVEL 15 | LEVEL 16 | LEVEL 17 | LEVEL 18 | LEVEL 19 | LEVEL 20

- *1* - Material Science of Powders, Thin Films, Substrates, & Glass
  - *b* - Powders, Thin Films, Substrates, & Glass
    - *iv* - Characterization of Powders, Thin Films, and Substrates
      - Characterizing powders, thin films & substrates
        - Characterizing powders, thin films & substrates
          - - Characterizing powders
            - - Diffraction of electrons, crystals, & X-rays
              - - Crystal Diffraction
            - - SEM (Scanning Electron Microscopy)
            - - TEM (Transmission Electron Microscop
            - - Scanning &
              - - Microscop
            - - Powder surfaces
          - - Characterizing thin films & substrates
            - - Grown thickness of films with deposition layers of thin substrates
            - - Films with deposition layers of thin substrates
            - - Deposition layers of thin substrates
              - - Thin substrates
              - - Deposition
            - - Grown thickness
        - - TiO2 & Spectrums
      - Spectroscopy Techniques
        - - Synthesized absorption
        - - NMR using proton spectroscopy
          - - Elemental
          - - H-1 Spectrosc
        - - Raman Transform
          - - Raman scattering
        - - FTIR (Fourier
    - *iii* - Characterization of Glass
  - *a* - Inorganic Chemistry
    - *ii* - Chemistry of atoms, molecules, ligands, & compounds
      - Characterization of compounds
        - - Compounds
          - - Compounds (monoclinic)
        - - Complexes of Gamma-Bar
          - - Gamma-
      - - 3-D Interactions of (e.g. Ligands, molecules, atoms, & bonding)
        - Interactions of Ligands with Hydrogen Molecules bonded
          - - Ligands coordinated with atoms
            - - Ligands
          - Interactions of Hydrogen Molecules
            - - Bonds of Hydrogen Molecules with
              - - Bonds of Hydrogen
                - - Hydrogen

LEVEL 20: structure, X-ray, diffraction, crystal, electron, microscopy, transmission, scanning, TEM, SEM, microscope, particles, powders, surface, films, thin, substrates, deposition, layer, thickness, grown, vapor, Si, sol-gel, tiO2, spectrum, absorption, synthesized, infrared, elemental, NMR, H-1, spectroscopy, photoelectron, Raman, transform, Fourier, FTIR, UV, differential, DSC, glass, melting, heating, groups, space, V, beta, Z, monoclinic, R, compound, alpha, gamma, bar, complexes, ligands, coordination, atoms, bonds, hydrogen, molecules, O

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8	LEVEL 9	LEVEL 10	LEVEL 11	LEVEL 12	LEVEL 13	LEVEL 14	LEVEL 15	LEVEL 16	LEVEL 17	LEVEL 18	LEVEL 19	LEVEL 20
															with	bonded				interactions
																				three-dimensional
											/ -									absorption

Appendix 8C MultiLink – Phrase Dendogram (SCI)
-Science Citation Index
-2002 Database

This dendrogram is the phrase equivalent of Appendix 8A. A phrase frequency analysis was performed on the Abstracts from the 2002 SCI database. The highest frequency high technical content phrases were selected, and a co-occurrence matrix was generated. It was normalized using the mutual information index. Phrase clustering was generated using the WINSTAT statistical package, and the following dendrogram was produced. Figure A8C-1 below shows the entire dendogram. Figure A8C-2 shows the entire dendogram in a larger readable version in pieces over the following 5 pages. This dendrogram was the basis for the taxonomy shown in detail in Appendix 8D.

Figure A8C-1. Entire MultiLink-Phrase Dendogram (small scale)

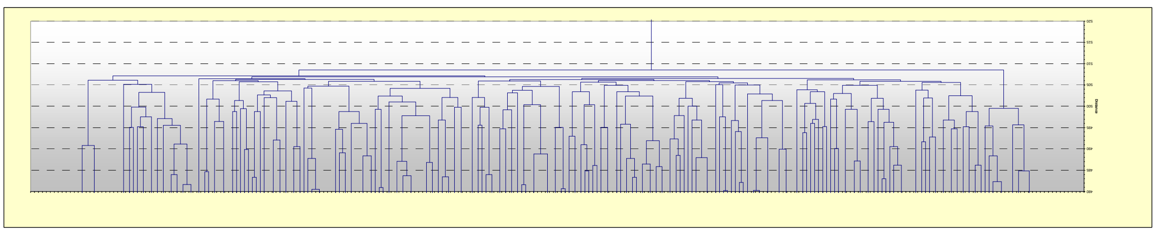
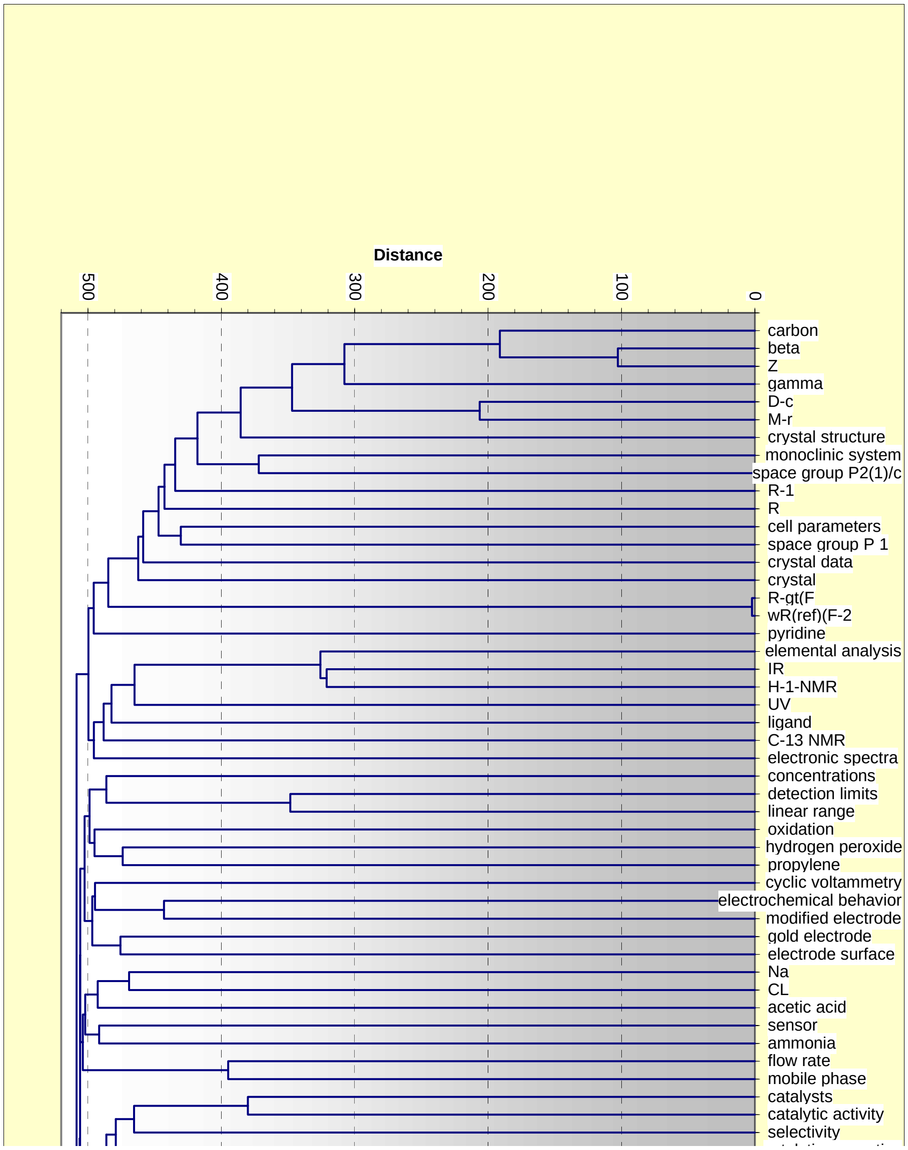
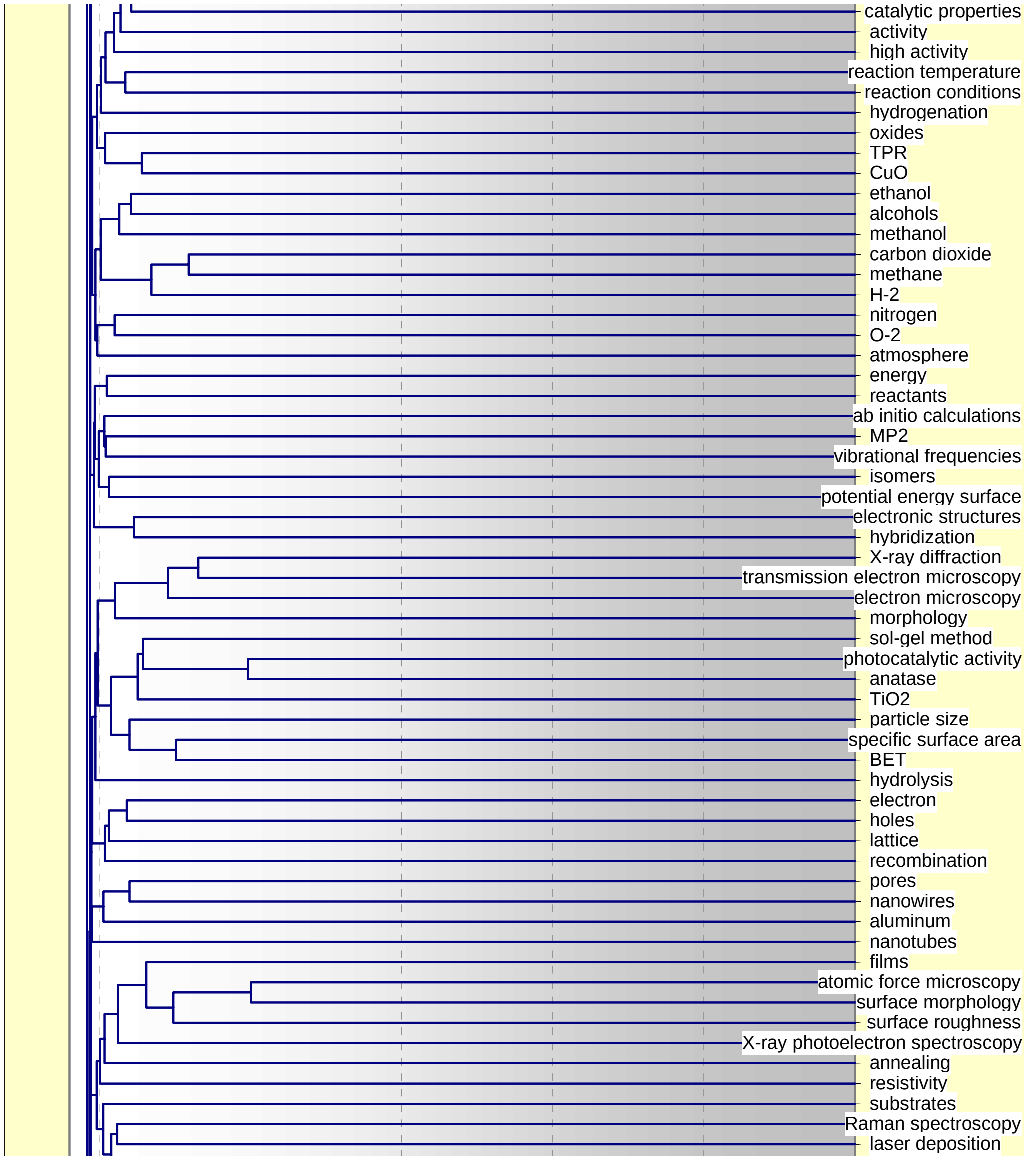
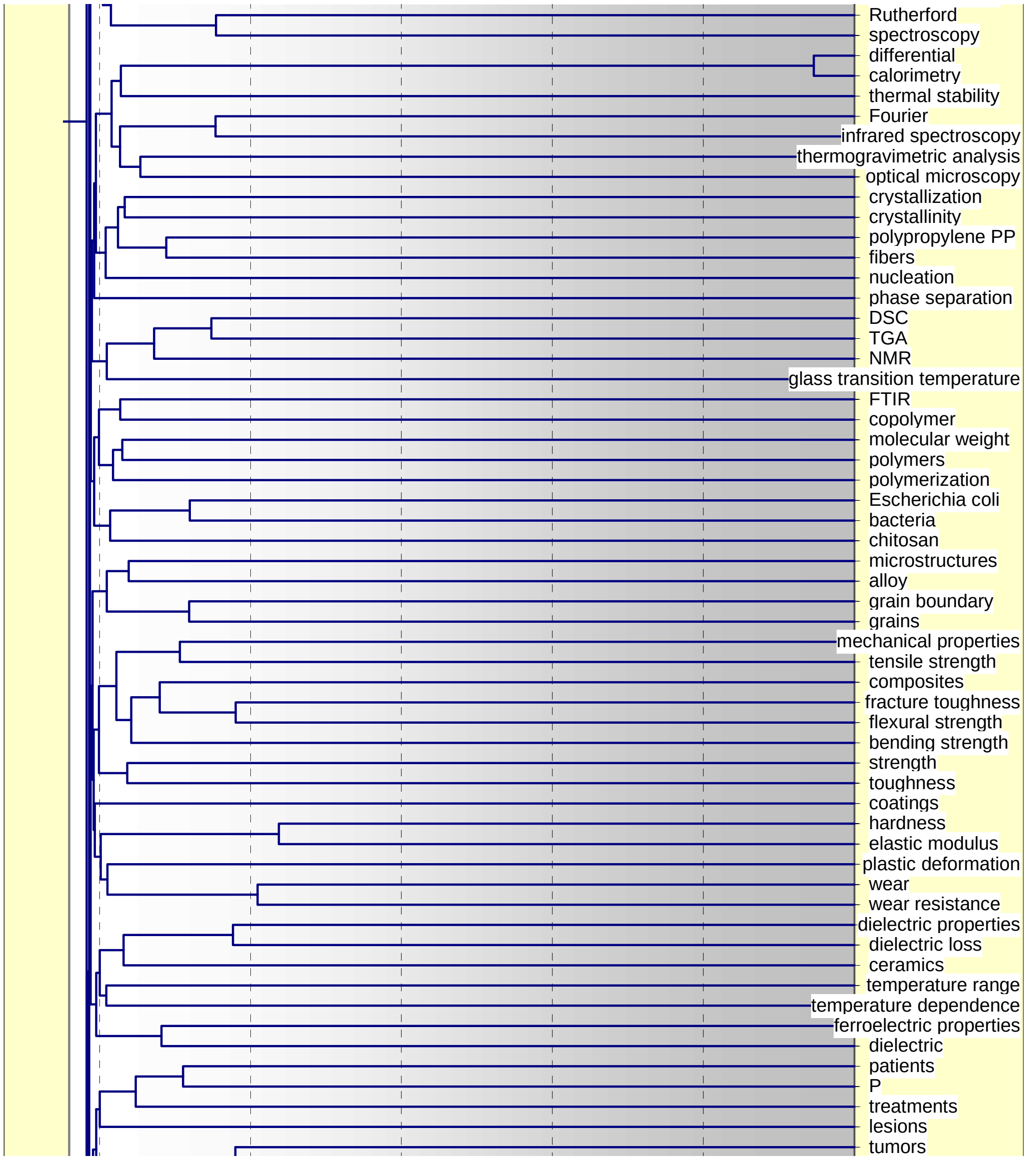


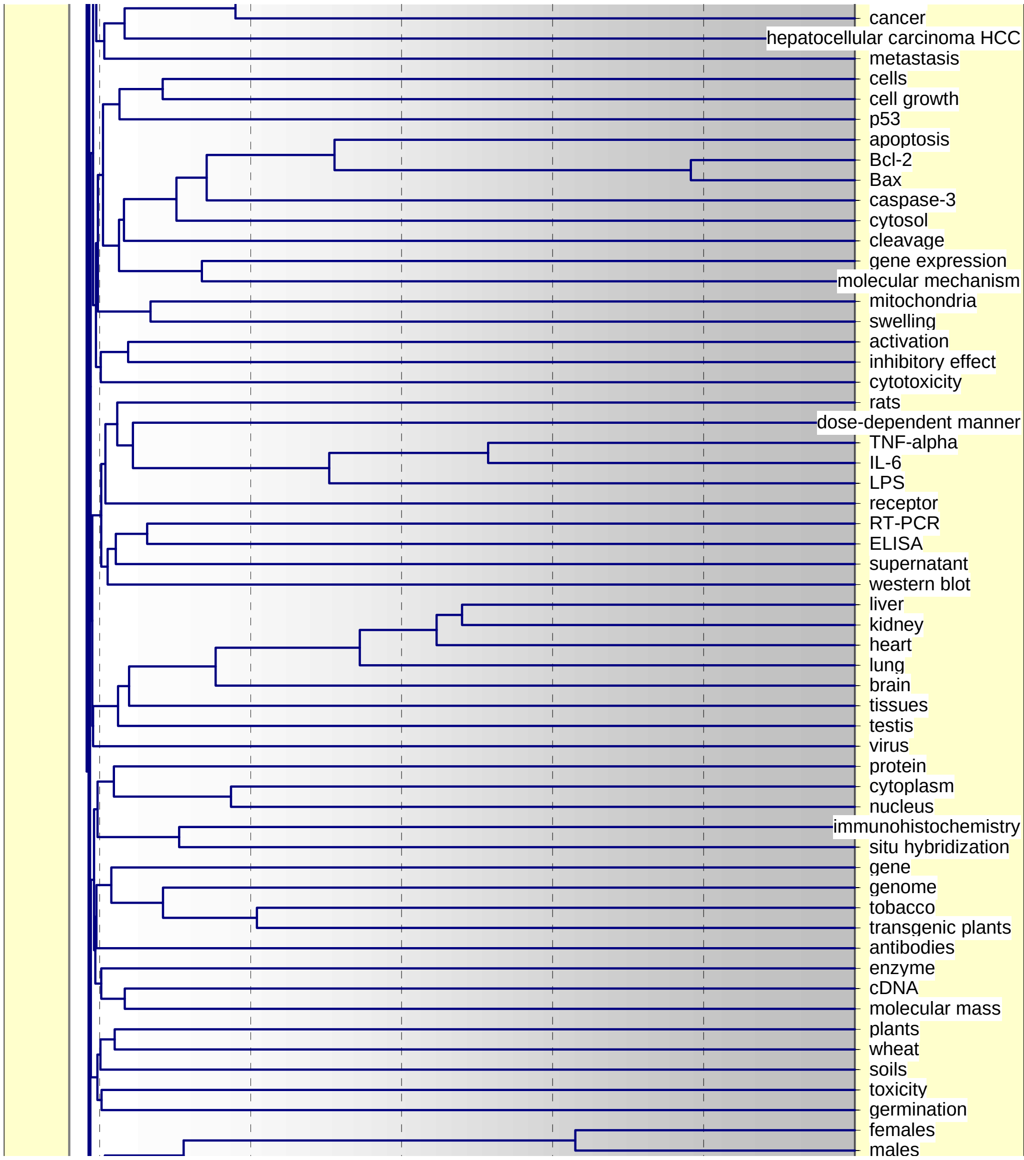
Figure A8C-2. MultiLink-Phrase Dendogram (large scale)
-- shown over next 5 pages.

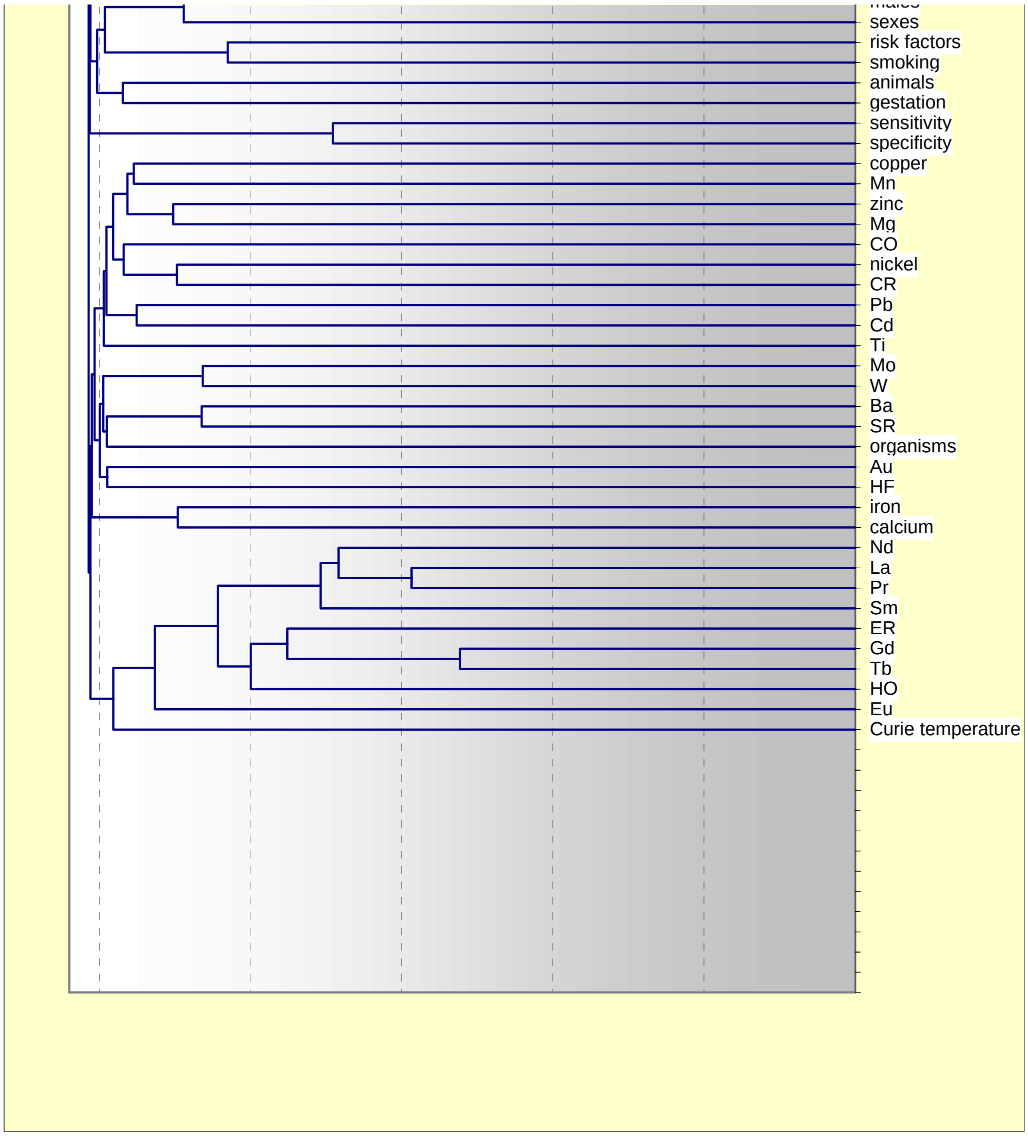

Distance
500
400
300
200
100
0
carbon
beta
Z
gamma
D-c
M-r
crystal structure
monoclinic system
space group P2(1)/c
R-1
R
cell parameters
space group P 1
crystal data
crystal
R-gt(F
wR(ref)(F-2
pyridine
elemental analysis
IR
H-1-NMR
UV
ligand
C-13 NMR
electronic spectra
concentrations
detection limits
linear range
oxidation
hydrogen peroxide
propylene
cyclic voltammetry
electrochemical behavior
modified electrode
gold electrode
electrode surface
Na
CL
acetic acid
sensor
ammonia
flow rate
mobile phase
catalysts
catalytic activity
selectivity


catalytic properties
activity
high activity
reaction temperature
reaction conditions
hydrogenation
oxides
TPR
CuO
ethanol
alcohols
methanol
carbon dioxide
methane
H-2
nitrogen
O-2
atmosphere
energy
reactants
ab initio calculations
MP2
vibrational frequencies
isomers
potential energy surface
electronic structures
hybridization
X-ray diffraction
transmission electron microscopy
electron microscopy
morphology
sol-gel method
photocatalytic activity
anatase
TiO2
particle size
specific surface area
BET
hydrolysis
electron
holes
lattice
recombination
pores
nanowires
aluminum
nanotubes
films
atomic force microscopy
surface morphology
surface roughness
X-ray photoelectron spectroscopy
annealing
resistivity
substrates
Raman spectroscopy
laser deposition



Rutherford
spectroscopy
differential
calorimetry
thermal stability
Fourier
infrared spectroscopy
thermogravimetric analysis
optical microscopy
crystallization
crystallinity
polypropylene PP
fibers
nucleation
phase separation
DSC
TGA
NMR
glass transition temperature
FTIR
copolymer
molecular weight
polymers
polymerization
Escherichia coli
bacteria
chitosan
microstructures
alloy
grain boundary
grains
mechanical properties
tensile strength
composites
fracture toughness
flexural strength
bending strength
strength
toughness
coatings
hardness
elastic modulus
plastic deformation
wear
wear resistance
dielectric properties
dielectric loss
ceramics
temperature range
temperature dependence
ferroelectric properties
dielectric
patients
P
treatments
lesions
tumors


cancer
hepatocellular carcinoma HCC
metastasis
cells
cell growth
p53
apoptosis
Bcl-2
Bax
caspase-3
cytosol
cleavage
gene expression
molecular mechanism
mitochondria
swelling
activation
inhibitory effect
cytotoxicity
rats
dose-dependent manner
TNF-alpha
IL-6
LPS
receptor
RT-PCR
ELISA
supernatant
western blot
liver
kidney
heart
lung
brain
tissues
testis
virus
protein
cytoplasm
nucleus
immunohistochemistry
situ hybridization
gene
genome
tobacco
transgenic plants
antibodies
enzyme
cDNA
molecular mass
plants
wheat
soils
toxicity
germination
females
males


sexes
risk factors
smoking
animals
gestation
sensitivity
specificity
copper
Mn
zinc
Mg
CO
nickel
CR
Pb
Cd
Ti
Mo
W
Ba
SR
organisms
Au
HF
iron
calcium
Nd
La
Pr
Sm
ER
Gd
Tb
HO
Eu
Curie temperature

Appendix 8D MultiLink – Phrase Taxonomy (SCI)
-Science Citation Index
-2002 Database

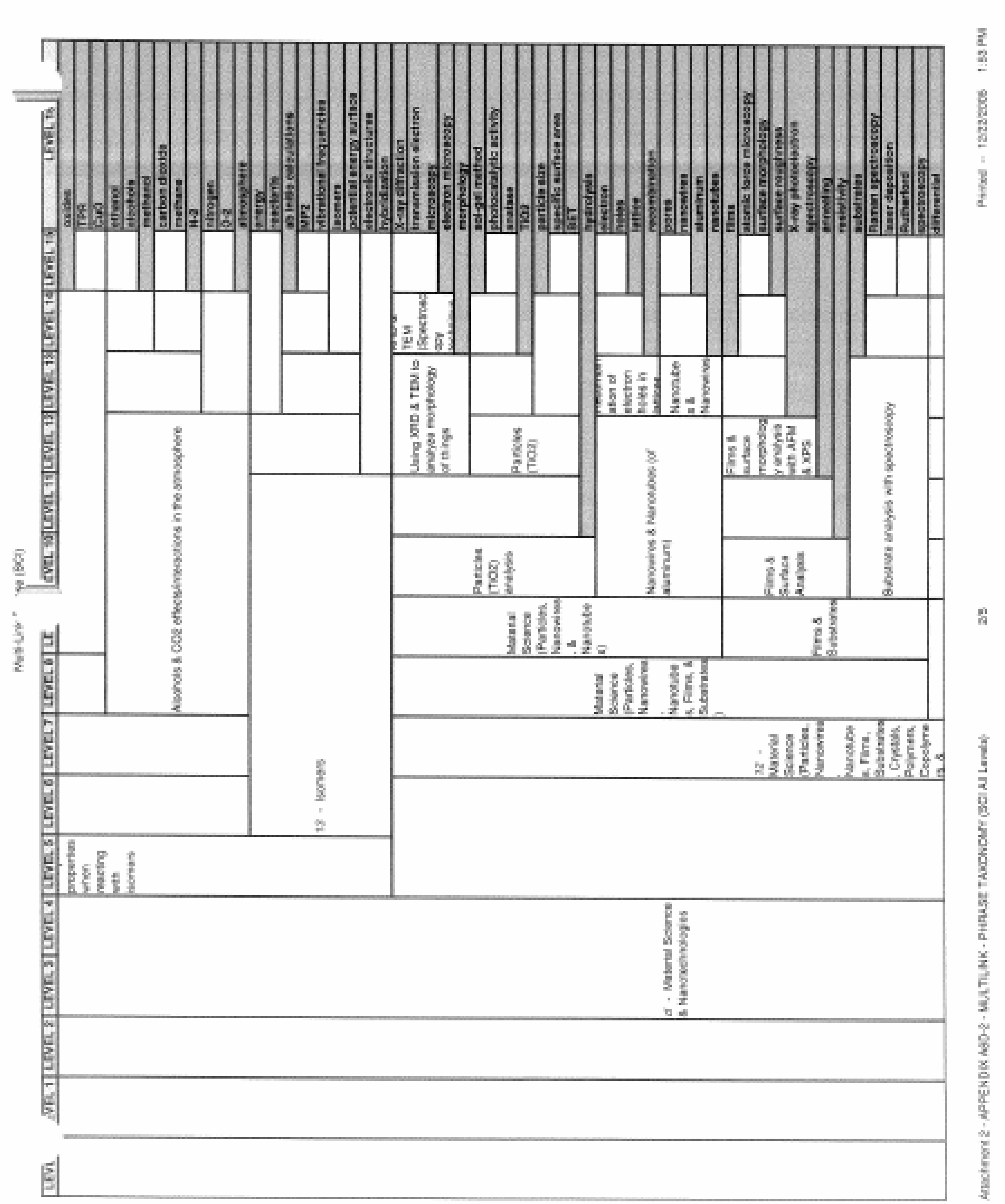
This Appendix is the phrase equivalent of Appendix 8B. This is the taxonomy that resulted from the dendrogram in Appendix 8C. Figure A8D-1 shows the top-level taxonomy (Levels 0-4).

Figure A8D-1 Multilink – Phrase Taxonomy (SCI, Levels 0-4)

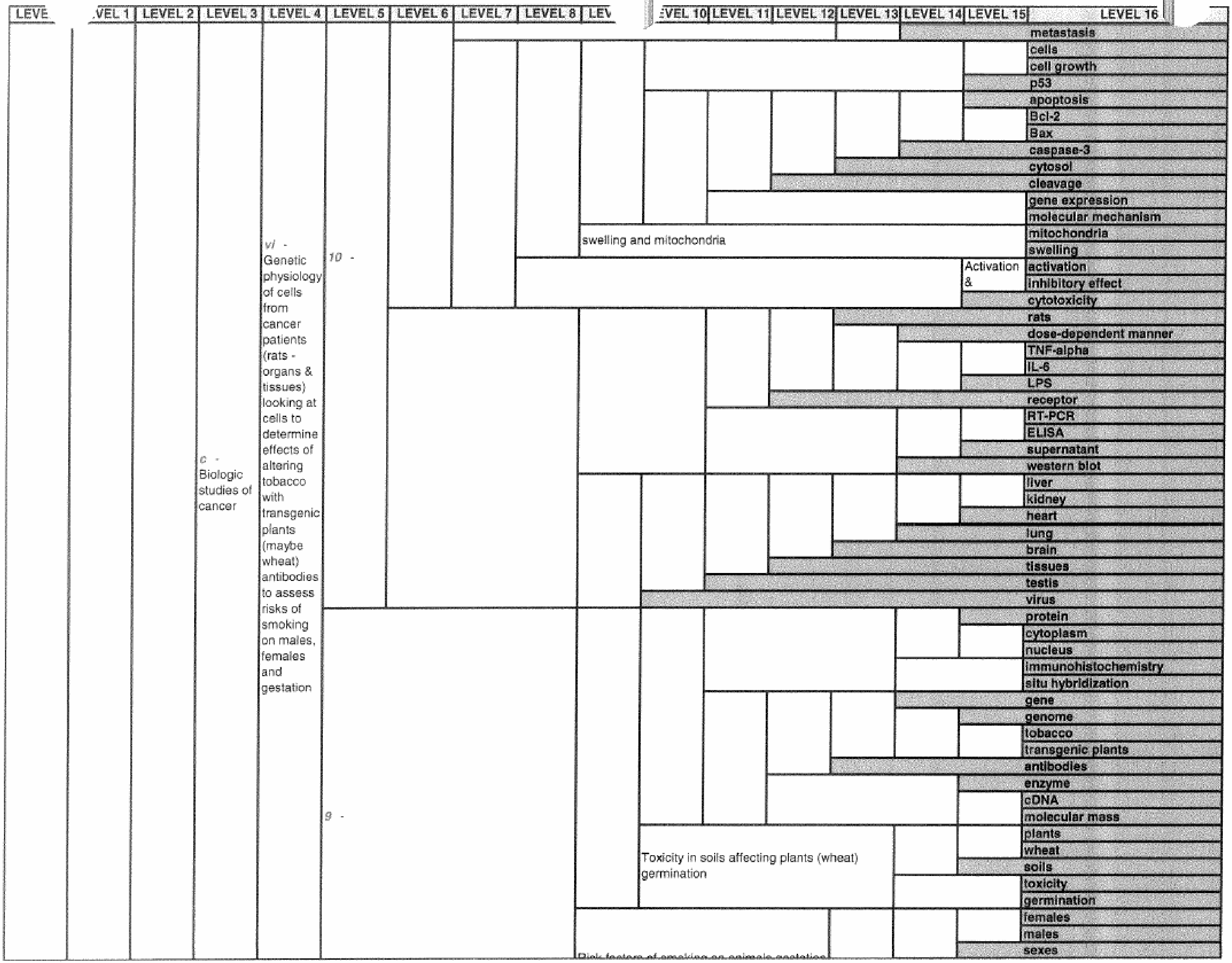
<table>
<tr><th>LEVEL 0</th><th>LEVEL 1</th><th>LEVEL 2</th><th>LEVEL 3</th><th>LEVEL 4</th></tr>
<tr><td rowspan="14">Physical & Biological Sciences</td><td rowspan="6">Physical Sciences (Organic Chemistry)</td><td rowspan="3">Organic Chemistry</td><td rowspan="2">Measurements of carbon crystals & cell structures</td><td>Measurements of carbon crystals & cell structures</td></tr>
<tr><td>R[gt](F) & wR[ref](F^2) [Note: gt and ref are subscripts]</td></tr>
<tr><td colspan="2">Pyridines</td></tr>
<tr><td rowspan="3">Elemental Anaysis</td><td rowspan="2">Elemental Analysis (e.g. Ligands)</td><td>Elemental analysis of ligands</td></tr>
<tr><td>C-13 NMR</td></tr>
<tr><td colspan="2">Electronic Spectra</td></tr>
<tr><td rowspan="8">Physical (Materials, Nanotechnology & Inorganic Chemistry) & Biological Sciences</td><td rowspan="4">Material Science, Nanotechnology, & Biologic Cancer Studies</td><td rowspan="2">Material Science & Nanotechnologies</td><td>Using cyclic voltammetry to detect salts & ammonias to assess reactions & catalysts properties when reacting with isomers</td></tr>
<tr><td>Material Science of Microstructures (particles, nanotubes, nanowires, films, substrates, crystals, organic fibers, polymers, copolymers, glass, ceramics, composites, & coatings)</td></tr>
<tr><td rowspan="2">Biologic studies of cancer</td><td>Genetic physiology of cells from cancer patients (rats - organs & tissues) looking at cells to determine effects of altering tobacco with transgenic plants (maybe wheat) antibodies to assess risks of smoking on males, females and gestation</td></tr>
<tr><td>Sensitivity & Specificity</td></tr>
<tr><td rowspan="4">Inorganic Chemistry</td><td rowspan="2">Elements (Inorganic Chemistry)</td><td>Elements (Cu, Mn, Zn, Mg, CO, Ni, Pb, Cd, Ti, Mo, W, Ba, Au, HF) Cr (SR - organisms)</td></tr>
<tr><td>Elements (Iron & Calcium)</td></tr>
<tr><td rowspan="2">Elements (Inorganic Chemistry)</td><td>Elements (Nd, La, Pr, Sm, Gd, Tb, HO, Eu, ER {Endoplasic Reficulum =>I.e. cell membrane)</td></tr>
<tr><td>Currie Temperature</td></tr>
</table>

Figure A8D-2 Multilink – Phrase Taxonomy (SCI, All Levels)

LEVE	VEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8	LEV	VEL 10	LEVEL 11	LEVEL 12	LEVEL 13	LEVEL 14	LEVEL 15	LEVEL 16
	B - Physical Sciences (Chemistry)		4 - Organic Chemistry	h - Measurements of carbon crystals & cell structures	xii - Measurements of carbon crystals & cell structures	20 -										carbon
																beta
																Z
																gamma
																D-c
																M-r
																cyrstal structure
																monoclinic system
																space group P2(1)/c
																R-1
																R
																cell parameters
																space group P 1
																cyrstal data
						19 -										crystal
					xi - R[gt](F) & wR[ref](F^2) [Note: gt and ref are subscripts]											18 - R-gt(F
																17 - wR(ref)(F-2
				g - Pyridine												pyridine
			3 - Elemental Analysis								f - Elemental Analysis (e.g. Ligands)	x - Elemental analysis of ligands	16 -			elemental analysis
																IR
																H-1-NMR
																UV
													15 -			ligand
												ix - C-13 NMR				C-13 NMR
											e - Electronic Spectra					electronic spectra
					viii - Using cyclic voltammetry to detect salts & ammonias to assess reactions & catalysts	14 - Cyclic voltammetry to detect salts & ammonias reactions & catalysts						Looking at flow rates and phases to sense ammonias and salts				concentrations
																detection limits
																linear range
																oxidation
																hydrogen peroxide
																propylene
																cyclic voltammetry
																electrochemical behavior
																modified electrode
																gold electrode
																electrode surface
															Na & Cl (Salts)	Na
																CL
																acetic acid
																sensor
																ammonia
																flow rate
																mobile phase
								Catalytic properties of CuO					- Catalytic properties	Selectivity of catalysts	- Catalysts	catalysts
																catalytic activity
																selectivity
																catalytic properties
																activity
																high activity
											- Reaction- (temperature, conditions)					reaction temperature
																reaction conditions
																hydrogenation


Alcohols & CO2 effects/impressions in the atmosphere
12 - Isomers
Particles (TiO2) analysis
Nanowires & Nanotubes (of aluminum)
Films & Surface Analysis
Films & Substrates
Substrate analysis with spectroscopy
Using XRD & TEM to analyze morphology of things
d - Material Science & Nanotechnologies
oxides
TiO2
CuO
ethanol
alcohols
methanol
carbon dioxide
methane
H-2
nitrogen
O-2
atmosphere
energy
reactants
ab initio calculations
MP2
vibrational frequencies
isomers
potential energy surface
electronic structures
hybridization
X-ray diffraction
transmission electron microscopy
electron microscopy
morphology
sol-gel method
photocatalytic activity
anatase
particle size
specific surface area
BET
hydrolysis
electron
holes
lattice
recombination
pores
nanowires
aluminum
nanotubes
films
atomic force microscopy
surface morphology
surface roughness
X-ray photoelectron spectroscopy
annealing
resistivity
substrates
Raman spectroscopy
laser deposition
Rutherford
spectroscopy
differential
Attachment 2 - APPENDIX ABD-2 - MULTILINK - PHRASE TAXONOMY (SCI All Levels)
2/3
Printed - 12/22/2005 1:53 PM

LEVL	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8	LE	LEVEL 10	LEVEL 11	LEVEL 12	LEVEL 13	LEVEL 14	LEVEL 15	LEVEL 16
I -	A - Physical (Materials, Nanotechnology & Inorganic Chemistry) & Biological Sciences	2 - Material Science, Nanotechnology, & Biologic Cancer Studies			vii - Material Science of Microstructures (particles, nanotubes, nanowires, films, substrates, crystals, organic fibers, polymers, copolymers, glass, ceramics, composites, & coatings)		Glass)	Material Science (Crystals, Polymers, Coplymers, & Glass)		Crystals, Polymers, & Glass						calorimetry
																thermal stability
																Fourier
																infrared spectroscopy
																thermogravimetric analysis
																optical microscopy
																crystallization
																crystallinity
																polypropylene PP
																fibers
																nucleation
																phase separation
																DSC
																TGA
																NMR
																glass transition temperature
										Using FTIR to look at e.coli bacteria and chitosans on polymer and copolymer surfaces						FTIR
																copolymer
																molecular weight
																polymers
																polymerization
																Escherichia coli
																bacteria
																chitosan
							11 - Material properties of alloy composites and ceramic coatings		Composites, Coatings, & Alloy Microstructures	Properties of Alloy microstructures						microstructures
																alloy
																grain boundary
																grains
										Properties of composites & coatings	Strength properties of composites					mechanical properties
																tensile strength
																composites
																fracture toughness
																flexural strength
																bending strength
																strength
																toughness
											Properties of coatings					coatings
																hardness
																elastic modulus
																plastic deformation
																wear
																wear resistance
									Ceramics							dielectric properties
																dielectric loss
																ceramics
																temperature range
																temperature dependence
																ferroelectric properties
																dielectric
							Treatments of patients with cancer & tumors (hepatocellular carcinoma [HCC])									patients
																P
																treatments
																lesions
																tumors
																cancer
																hepatocellular carcinoma HCC


LEVE
VEL 1
LEVEL 2
LEVEL 3
LEVEL 4
LEVEL 5
LEVEL 6
LEVEL 7
LEVEL 8
LEV
EVEL 10
LEVEL 11
LEVEL 12
LEVEL 13
LEVEL 14
LEVEL 15
LEVEL 16
c - Biologic studies of cancer
vi - Genetic physiology of cells from cancer patients (rats - organs & tissues) looking at cells to determine effects of altering tobacco with transgenic plants (maybe wheat) antibodies to assess risks of smoking on males, females and gestation
10 -
9 -
swelling and mitochondria
Activation &
Toxicity in soils affecting plants (wheat) germination
metastasis
cells
cell growth
p53
apoptosis
Bcl-2
Bax
caspase-3
cytosol
cleavage
gene expression
molecular mechanism
mitochondria
swelling
activation
inhibitory effect
cytotoxicity
rats
dose-dependent manner
TNF-alpha
IL-6
LPS
receptor
RT-PCR
ELISA
supernatant
western blot
liver
kidney
heart
lung
brain
tissues
testis
virus
protein
cytoplasm
nucleus
immunohistochemistry
situ hybridization
gene
genome
tobacco
transgenic plants
antibodies
enzyme
cDNA
molecular mass
plants
wheat
soils
toxicity
germination
females
males
sexes

LEVEL | LEVEL 1 | LEVEL 2 | LEVEL 3 | LEVEL 4 | LEVEL 5 | LEVEL 6 | LEVEL 7 | LEVEL 8 | LEVEL 9 | LEVEL 10 | LEVEL 11 | LEVEL 12 | LEVEL 13 | LEVEL 14 | LEVEL 15 | LEVEL 16

- risk fa[illegible] of smoking on animals gestation (epidimiology of smoking)
  - risk factors
  - smoking
  - animals
  - gestation
- v - Sensitivity & Specificity
  - 8 - sensitivity
  - 7 - specificity
- 1 - Inorganic Chemistry
  - b - Elements (Inorganic Chemistry)
    - iv - Elements (Cu, Mn, Zn, Mg, CO, Ni, Pb, Cd, Ti, Mo, W, Ba, Au, HF) Cr (SR - organisms)
      - 6 -
        - copper
        - Mn
        - zinc
        - Mg
        - CO
        - nickel
        - CR
        - Pb
        - Cd
        - Ti
      - 5 -
        - Mo
        - W
        - Ba
        - SR
        - organisms
        - Au
        - HF
    - iii - Elements (Iron & Calcium)
      - 4 - Iron
      - 3 - calcium
  - a - Elements (Inorganic Chemistry)
    - ii - Elements (Nd, La, Pr, Sm, Gd, Tb, HO, Eu, ER (Endoplasic Reticulum
      - 2 -
        - Nd
        - La
        - Pr
        - Sm
        - ER
        - Gd
        - Tb
        - HO
      - 1 -
        - Eu
    - i - Currie Temperature
      - Curie temperature

Appendix 8E – MultiLink – Word Flat Taxonomy

Figure A8E-1 – Multi-Word Flat Taxonomy

MULTI-LINK (WORD) - FLAT TAXONOMY	
THEME	**SUB-THEME**
BIOLOGICAL & MEDICAL SCIENCES	Cancer & Disease Research
	Clinical Medical Treatments
	Epidemiology
	Genetics
CHEMISTRY	Inorganic Chemistry
	Organic Chemistry
	Physical Chemistry
	Polymers & Copolymer Chemistry
COMPUTER SCIENCES & SYSTEMS	Algorithms
	Modeling & Simulation
	Signal & Image Processing
	Systems
ENVIRONMENTAL SCIENCES	Agronomy
	Ecology
MATERIAL SCIENCES	Ceramics & Composites
	Crystals
	Glass
	Nanoparticles & Microstructures
	Powders
	Thin Films & Substrates
PHYSICS & MATHEMATICS	General Physics
	Lasers & Optics
	Mathematics
	Spectroscopy

Appendix 9A – Greedy String Tiling (GST) Method

Greedy String Tiling clustering is a method of grouping text or text character documents (files) by similarity. All documents to be grouped are placed in a database. Each pair of documents is compared by GST, an algorithm originally used to detect plagiarism (Wise, 1993; Prechelt et al, 2002), and a similarity score is assigned to the pair. Then hierarchical aggregation clustering (Rasmussen, 1992; Steinbach, 2000) is performed on all the documents, using the similarity score for group assignment.

Greedy String Tiling computes the similarity of a pair of documents in two phases. First, all documents to be compared are parsed, and converted into token strings (words or characters). Second, these token strings are compared in pairs for determining the similarity of each pair. During each comparison, the GST algorithm attempts to cover one token string (document) with sub-strings ('tiles') taken from the other string. These sub-strings are not allowed to overlap, resulting in a one to one mapping of tokens. The attribute greedy stems from the fact that the algorithm matches the longest sub-strings first.

A number of similarity metrics can be defined once the tiling is completed. One similarity metric is the percentage of both token strings that is covered. Another similarity metric is the absolute number of shared tokens. A third similarity metric is the mutual information index. Depending on the purpose of the matching, additional weightings can be used for the similarity matrix to increase the ranking precision. For example, if plagiarism is one study objective, additional weighting could be given to shared string length. All similarity metrics have positive and negative features, and the choice of metric is somewhat influenced by the study objectives and the structure of the database.

Once the document similarity matrix has been generated, myriad clustering techniques can be used to produce a classification scheme (taxonomy). In the present study, multi-link hierarchical aggregation was used. Three clustering variants were actually generated, although the extension to other clustering schemes is straight-forward. Single-link, average-link, and complete-link variants are implemented. The variants differ in how the decision of merging to clusters is made. Single-link requires that the similarity of at least two documents is higher than a certain threshold, while complete-link requires that the similarity between all documents in both clusters be higher than a threshold. Average-link requires that the average pair-wise similarity between the documents of both clusters exceed the threshold. For the present study, complete-link appeared to give good results, and was the clustering method used.

Appendix 9B – Greedy String Tiling Clusters
68 Clusters (SCI)

A summary of the cluster analysis is shown below in Table A9-1. Each cluster is shown in more detail immediately after Table A9-1. The format for each cluster is cluster number, followed by number of Abstracts in cluster (in parentheses), followed by phrases and their frequencies. Clusters are ordered by number of Abstracts in cluster, largest first.

Table A9-1. Summary Listing of GST Cluster analysis

Based On ==>		GST
DATA SOURCE ==>		SCI INDEX
# ITEMS ==>		68 CLUSTERS
CLUSTER #	# RECORDS	**DESCRIPTION**
0	n/a	n/a
1	234	studies involving the growth of crystals and their associated material properties characteristics. The key words “(C) Elsevier Science B. V.” is a publisher often referenced in the original reference data library.
2	230	size metrics such as angstroms, nm, and degrees that are associated in characterizing atom elements, crystal structures, compounds, cells, and groups.
3	190	characterizing of thin films and substrates using various spectroscopic techniques such as xrd, afm, xps, ftir, TEM, SEM, and sol-gel method.
4	119	physical chemistry properties of catalysts and reactions of various elements and compounds.
5	117	characterization of microstructure materials such as nanoparticles, nanowires, powders, and crystals using various spectroscopic techniques that include TEM, SEM, and XRD -- tio2, aluminum oxide??
6	112	different methods for determining and/or detecting concentrations of different solutions along with their detection limitations.
7	111	physiology of cells, genes, and human proteins to detect and treat cancers with emphasis on gastric cancer, anterior polar cataracts, and epithelial cells.
8	94	control system theory and feedback methods for applied applications using neural networks, fuzzy logic, in the following systems such as power, time, chaotic, closed loop, and control.
9	86	on methods and treatments of Chinese patients with various diseases such as nasopharyngeal carcinoma, acute cholangitis, acute testicular torsion, by comparing the different doses, and various other factors.
10	86	on low temperature effects on sintering & dielectric properties of ceramics (ferroelectric, and glass) and piezoelectric materials using XRD to analyze these properties.
11	76	study of atomic and molecular properties of b3lyp (benzoylcyclohexanedione).
12	74	mathematics symbol notations commonly associated with statistics.
13	68	terminology associated with applied mathematic boundary value problems such as those used in neural networks.
14	66	genetic sequencing and molecular biology of proteins, genes, amino acids, cells including those of human fetal brains, plants and escherichia coli.
15	66	modeling algorithms used in fluid dynamics, and ecosystems.
16	64	on linear and non-linear numerical methods for applied mathematics such as finite element analysis, least squares, navier stokes, time domain method, and stochastic averaging method.
17	62	characterization of glucopyranosyl-like compounds and structures using spectroscopic techniques.

18	57	techniques such as sol-gel and piezoelectric quartz crystals used to characterize surface properties of electrodes.
19	49	properties of lasers and optics, emphasizing nd yag lasers.
20	46	characterizing the properties of Titanium dioxide (TiO2) microstructure materials such as particles, powders, crystallines, and thin films using sol-gel and XRD techniques.
21	45	algorithms such as adaptive genetic, neural network, fuzzy logic, and winc .
22	43	effects of temperature on various magnetic properties associated with compounds.
23	41	the properties and effects of polymerization and polymers.
24	38	physiology of cells, proteins, and tissues and their relation to various forms of cancer in humans such as gastric cancer, hepatocellular carcinoma, breast cancer, liver cancer.
25	38	effects of ion implantation into silicon layers using metal vapor vacuums and analyzing the effects via FTIR and UV visible spectroscopic techniques.
26	37	characterizing emission properties that occur in the study of photoluminescence devices.
27	34	material properties of various alloys (s, h, ti, fe, co, zn, b2, nb, cu).
28	33	detecting and measuring the properties of nuclear particles, such as decay schemes and branching ratios.
29	33	modeling methods for the kinetic behavior various physical properties.
30	33	microstructure properties of al203, composites, particles, powders, and ceramics.
31	32	characterizing the corrosion resistance properties on surfaces, coatings, and films of various steel alloys.
32	31	dielectric properties of microstructures such as fullerenes, powders, and nanoparticles of the following materials, si, gd, ni, carbon, and coal.
33	31	characterizing the properties of various polymer and copolymer complexes from their fluorescence spectra.
34	30	characterizing the mechanical properties of polypropylene (pp) polymer and copolymer blends, composites and other structures using techniques such as DSC and SEM,
35	29	microstructure properties of alloy materials consisting of ti, ni, sr, nb, mg, al.
36	29	mechanical properties, such as strength, of polyethylene magnesium hydroxide composites, fibers, concrete, woodceramics, and polysilicon.
37	29	physiology of rat cells to determine the effects on blood flow from maotai liquor and white wine.
38	29	characterizing physical properties of various compounds for different temperature ranges.
39	28	characterizing the thermal properties and crystalline structures of glass and polymers using techniques such as xrd, dsc, and ftir.
40	28	modeling the properties and interactions of molecular compounds and structures.
41	28	characterizing electron quantum physics properties of various elements.
42	27	models of physical properties of nuclear particles such as energy states, spins, antiferromagnetic coupling, and magnetic fields.
43	27	characterizing the magnetic properties of iron (fe) films and nanocomposite microstructures.
44	27	using fluorescence methods to characterize dna binding abilities resulting from dna interactions with other compounds.
45	26	various methods and modeling of the effects of physical properties related to temperature.
46	26	studying the effects of surface area related to adsorption of such powder materials as tio2 and al2o3 using xrd and xps techniques.

47	26	studying changes in gene expression of cells, proteins, and tissues due to hepatocellular carcinoma (HCC).
48	26	components of mathematics equations, solutions and techniques.
49	26	various studies using the technique of scanning tunneling microscopy (STM) to image surfaces.
50	25	studying the concentration dependent physiology of cells and membranes from rats.
51	24	study of magnetic fields and their effects.
52	24	reactions and synthesis of organic compounds.
53	24	signal processing algorithms for feature extraction in images and speech recognition using such techniques as fractals, wavelets, and neural networks.
54	24	heat transfer properties applied to refrigeration systems.
55	23	characterizing soil properties such as soil moisture and their effects.
56	23	material properties such as deformation and strain on the grains of alloy microstructures.
57	21	adsorption properties of organic compounds such as bovine serum albumin (BSA) proteins.
58	21	ferroelectric, dielectric, and pyroelectric properties of thin films, to include their effects on polarization and coupling.
59	21	sciences with second and third order processes such as harmonics, wave generation, phases, and order primarily associated with the physics of non-linear optics, and crystal structures.
60	21	effects of the polymorphism of genes on different human diseases.
61	21	gaussian beam propagation properties in applications with lasers and optics.
62	20	material properties (such as mechanical, toughness, and strength) of ceramics, glass and composites.
63	20	lasers used to study plasma and nuclear physics properties.
64	20	characterizing black hole properties using techniques such as the brick wall method.
65	20	characterizing properties of nuclear and elementary particles such as cross-sectional energies, isospin fractination, and energy states.
66	20	principles of Plasma Physics in various applications, such as the tokamak reactor and superconducting.
67	20	reaction properties and conditions of alcohols such as ketones, bromides, and aldehydes for improving yields.
68	20	physical properties of materials (e.g. piezoelectric) that characterize strength such as crack growth, stress, strain, and fatigue.

GST Clustering Results (Type: AVR, group average), Clusters for 7.0% Threshold

Cluster 1 [234]

"**v**" (289) "**c**" (269) "**b**" (243) "**science**" (218) "**n**" (109) "**k**" (87) "**method**" (85) "**paper**" (65) "**e**" (63) "**growth**" (62) "**x**" (59) "**s**" (58) "**two**" (55) "**p**", "**g**" (54) "**system**" (48) "**field**", "**crystals**" (47) "**time**" (45) "**h**" (43) "**based**" (42) "**crystal**" (39) "**fuzzy**" (38) "**temperature**", "**state**", "**equal**", "**model**" (37) "**process**", "**number**" (36) "**systems**", "**new**" (35) "**experimental**" (33) "**high**" (32) "**d**", "**single**" (31) "**phase**", "**size**", "**order**" (30) "**properties**", "**structure**" (29) "**c science**" (217) "**science b**" (209) "**b v**" (208) "**carbon nanotubes**" (17) "**n pentane**" (11) "**crystal growth**", "**c e**" (10) "**single crystals**", "**k n**", "**n n**", "**experimental data**", "**lead tungstate**" (8) "**fuzzy systems**", "**equivalent mod**", "**tungstate crystals**", "**e degree**", "**electric field**", "**k k**", "**k c**", "**v v**", "**i v**" (7) "**science b v**", "**c science b**" (208) "**lead tungstate crystals**" (7) "**v equivalent mod**" (5) "**method c science**", "**single crystals grown**", "**systems based genuine**", "**grey tone mask**", "**fuzzy n cell**", "**ggg polycrystalline material**", "**based genuine valued**", "**i v curve**", "**mechanism c science**", "**c e degree**", "**d e f**", "**c e degrees**", "**alpha moc1 x**", "**c d e**", "**b c d**", "**wall carbon nanotubes**" (4)

Focuses primarily on studies involving the growth of crystals and their associated material properties characteristics. The key words “(C) Elsevier Science B. V.” is a publisher often referenced in the original reference data library.

Cluster 2 [230]

"**c**" (353) "**angstrom**" (274) "**n**" (219) "**two**" (218) "**o**" (216) "**b**" (196) "**crystal**" (193) "**structure**" (189) "**r**" (180) "**x**" (173) "**degrees**" (167) "**complex**" (165) "**nm**" (162) "**v**" (143) "**group**" (134) "**mu**" (131) "**compound**", "**ray**" (130) "**beta**", "**atoms**" (128) "**co**", "**z**" (122) "**cu**" (119) "**h2o**" (114) "**space**" (113) "**ii**" (111) "**i**" (105) "**h**" (102) "**complexes**" (100) "**d**", "**diffraction**" (94) "**m**" (89) "**three**", "**f**" (85) "**one**", "**title**" (83) "**atom**" (80) "**synthesized**" (79) "**reaction**" (77) "**x ray**" (130) "**space group**" (112) "**ray diffraction**" (82) "**crystal structure**", "**degrees v**" (62) "**title compound**" (59) "**f 000**", "**single crystal**" (52) "**d c**" (47) "**angstrom z**" (46) "**group p2**", "**angstrom c**", "**c science**" (42) "**g cm**", "**crystal x**" (40) "**hydrogen bonds**", "**angstrom b**" (39) "**angstrom beta**" (38) "**nm b**" (34) "**nm c**" (33) "**b v**", "**science b**", "**z d**" (32) "**2h o**" (31) "**system space**" (29) "**cell parameters**" (28) "**nm beta**", "**oxygen atoms**", "**three dimensional**", "**z r**" (26) "**x ray diffraction**" (82) "**space group p2**" (41) "**crystal x ray**" (40) "**single crystal x**" (39) "**science b v**" (32) "**c science b**" (31) "**system space group**" (29) "**monoclinic space group**" (25) "**z d c**" (23) "**group p2 n**", "**cm f 000**" (20) "**g cm f**" (17) "**monoclinic system space**", "**space group p**", "**nm z d**", "**angstrom z r**" (16) "**pi pi stacking**", "**unit cell parameters**" (15)

Focuses on the size metrics such as angstroms, nm, and degrees that are associated in characterizing atom elements, crystal structures, compounds, cells, and groups.

Cluster 3 [190]

"**films**" (595) "**film**" (217) "**c**" (189) "**thin**" (184) "**x**" (163) "**temperature**" (154) "**deposition**" (112) "**ray**" (111) "**substrate**" (100) "**surface**" (96) "**substrates**" (94) "**v**", "**deposited**" (92) "**si**" (91) "**structure**" (90) "**annealing**" (87) "**properties**" (84) "**high**" (77) "**diffraction**" (76) "**n**" (75) "**pzt**" (74) "**electron**" (70) "**b**" (67) "**science**" (66) "**spectroscopy**" (65) "**degreesc**" (60) "**microscopy**", "**nm**" (57) "**100**" (56) "**spectra**" (55) "**phase**", "**sputtering**" (51) "**plasma**", "**optical**" (50) "**layer**" (49) "**method**", "**carbon**" (48) "**increasing**", "**h**" (47) "**thin films**" (141) "**x ray**" (110) "**c science**" (65) "**ray diffraction**" (64) "**b v**", "**science b**" (53) "**sol gel**", "**films deposited**" (41) "**thin film**" (39) "**room temperature**" (33) "**ray photoelectron**" (32) "**atomic force**", "**magnetron sputtering**" (29) "**electron microscopy**" (28) "**force microscopy**" (26) "**diffraction xrd**", "**annealing temperature**" (22) "**photoelectron spectroscopy**", "**substrate temperature**" (21) "**pulsed laser**" (20) "**si substrates**", "**lb films**", "**vapor deposition**", "**chemical vapor**", "**films grown**", "**films x**" (19) "**laser deposition**", "**dielectric constant**", "**scanning electron**" (17) "**x ray diffraction**" (64) "**science b v**" (53) "**c science b**" (52) "**x ray photoelectron**" (32) "**ray diffraction xrd**", "**atomic force microscopy**" (22) "**ray photoelectron spectroscopy**" (21) "**chemical vapor deposition**" (19) "**pulsed laser deposition**" (17) "**photoelectron spectroscopy xps**" (15) "**scanning electron microscopy**", "**sol gel method**", "**fourier transform infrared**" (14) "**composite thin films**", "**transmission electron microscopy**" (12) "**force microscopy afm**", "**films x ray**" (11) "**si 100 substrates**", "**air water interface**" (9)

Focuses on the characterizing of thin films and substrates using various spectroscopic techniques such as xrd, afm, xps, ftir, TEM, SEM, and sol-gel method.

Cluster 4 [119]

"**catalyst**" (256) "**reaction**" (152) "**catalysts**" (134) "**activity**" (120) "**catalytic**" (96) "**co**" (92) "**c**" (89) "**selectivity**" (74) "**h**" (69) "**v**", "**n**" (65) "**b**" (61) "**temperature**" (60) "**al2o3**" (58) "**high**" (57) "**science**", "**surface**", "**conversion**", "**fe**" (52) "**oxidation**" (48) "**ni**" (47) "**acid**", "**reduction**", "**mo**" (46) "**higher**" (45) "**active**", "**ratio**" (43) "**hydrogenation**" (41) "**o**", "**carbon**", "**pd**" (39) "**conditions**", "**cu**" (37) "**amount**", "**gas**", "**sulfur**" (34) "**phase**" (33) "**sio2**" (32) "**oxygen**", "**xrd**" (31) "**c science**" (50) "**b v**", "**science b**" (42) "**catalytic activity**" (40) "**gamma al2o3**" (27) "**al2o3 catalyst**", "**reaction conditions**" (17) "**activity selectivity**" (16) "**molar ratio**" (15) "**sio2 catalyst**" (13) "**x ray**" (12) "**temperature programmed**", "**acetic acid**" (11) "**reaction temperature**", "**high activity**" (10) "**mo v**", "**fixed bed**", "**carbon dioxide**", "**lattice oxygen**", "**bed reactor**" (9) "**activated carbon**", "**ni b**", "**surface area**", "**selective oxidation**", "**partial oxidation**", "**amorphous catalyst**", "**c c**" (8) "**science b v**" (42) "**c science b**" (40) "**fixed bed reactor**" (9) "**x ray diffraction**" (7) "**mo v sio2**", "**p mo v**", "**gamma al2o3 catalyst**", "**na p mo**" (6) "**pd gamma al2o3**", "**ray diffraction xrd**", "**n2h4 h2o v2o5**", "**selective oxidation propane**", "**supercritical carbon dioxide**", "**maleic anhydride ma**" (5)

Focuses on the physical chemistry properties of catalysts and reactions of various elements and compounds.

Cluster 5 [117]

"**electron**" (155) "**diffraction**" (116) "**microscopy**" (108) "**x**" (107) "**ray**" (101) "**transmission**" (78) "**structure**" (69) "**high**" (63) "**c**" (58) "**nm**" (52) "**tem**" (50) "**phase**" (49) "**nanowires**" (42) "**particles**", "**powder**" (40) "**method**", "**size**" (39) "**xrd**" (38) "**tio2**" (35) "**temperature**" (34) "**growth**", "**crystal**" (33) "**scanning**", "**science**" (32) "**diameter**", "**synthesized**" (29) "**v**", "**spectroscopy**" (28) "**b**" (27) "**resolution**" (26) "**reaction**", "**nano**" (25) "**single**" (24) "**solution**" (23) "**energy**", "**mechanism**" (22) "**nanoparticles**" (21) "**x ray**" (101) "**electron microscopy**" (92) "**transmission electron**" (76) "**ray diffraction**" (65) "**c science**" (31) "**microscopy tem**" (29) "**electron diffraction**", "**diffraction xrd**" (27) "**high resolution**" (24) "**b v**", "**science b**", "**scanning electron**" (22) "**electron microscope**" (19) "**ray powder**" (15) "**area electron**", "**energy dispersive**", "**powder diffraction**" (14) "**resolution transmission**" (13) "**single crystal**" (12) "**diffraction transmission**", "**ray photoelectron**", "**dispersive x**", "**nanowire arrays**", "**xrd transmission**" (11) "**aluminum oxide**", "**room temperature**", "**anodic aluminum**", "**microscopy sem**", "**nano sized**" (9) "**transmission electron microscopy**" (67) "**x ray diffraction**" (65) "**electron microscopy tem**" (29) "**science b v**", "**c science b**" (22) "**ray diffraction xrd**" (20) "**scanning electron microscopy**", "**x ray powder**" (15) "**ray powder diffraction**", "**area electron diffraction**" (14) "**high resolution transmission**", "**resolution transmission electron**" (13) "**x ray photoelectron**", "**energy dispersive x**", "**diffraction xrd transmission**", "**diffraction transmission electron**", "**dispersive x ray**", "**xrd transmission electron**" (11) "**ray diffraction transmission**" (10) "**anodic aluminum oxide**" (9)

Focuses on the characterization of microstructure materials such as nanoparticles, nanowires, powders, and crystals using various spectroscopic techniques that include TEM, SEM, and XRD -- tio2, aluminum oxide??

Cluster 6 [112]

"**l**" (189) "**method**" (173) "**determination**" (138) "**detection**" (134) "**x**" (130) "**mol**" (96) "**ml**" (91) "**v**" (87) "**range**" (82) "**limit**" (68) "**mug**", "**linear**" (61) "**c**" (59) "**concentration**", "**ph**" (57) "**samples**", "**mg**" (50) "**sample**" (48) "**acid**", "**solution**" (47) "**water**" (45) "**b**" (44) "**similar**", "**standard**" (43) "**electrode**", "**peak**" (42) "**based**" (41) "**reaction**" (39) "**science**", "**relative**" (38) "**s**" (37) "**n**" (36) "**fluorescence**" (34) "**buffer**" (33) "**system**", "**conditions**", "**deviation**" (32) "**injection**" (31) "**sensitive**", "**complex**" (28) "**mol l**" (83) "**method determination**" (55) "**x mol**" (54) "**detection limit**" (53) "**mg l**" (40) "**b v**", "**science b**", "**c science**" (38) "**relative standard**" (35) "**standard deviation**", "**mug ml**" (31) "**mug l**" (25) "**ng ml**" (24) "**linear range**", "**detection limits**" (22) "**g ml**", "**x g**" (17) "**range x**" (16) "**flow injection**", "**determination trace**", "**x x**", "**l**

detection" (14) "**limit x**", "**v v**", "**concentration range**", "**method based**" (13) "**water samples**", "**l method**" (12) "**limit detection**" (11) "**x mol l**" (52) "**science b v**", "**c science b**" (38) "**relative standard deviation**" (28) "**l detection limit**" (14) "**detection limit x**" (13) "**x g ml**", "**mol l detection**" (11) "**x x mol**", "**method determination trace**", "**mg l mg**" (9) "**range x x**", "**l method determination**", "**l mg l**" (8) "**relative standard deviations**", "**limit x mol**" (7) "**x similar x**", "**ion exclusion chromatography**", "**0x10 g ml**", "**glycerol propylene glycol**" (6)

Focuses on different methods for determining and/or detecting concentrations of different solutions along with their detection limitations.

Cluster 7 [111]

"**cells**" (400) "**cell**" (259) "**expression**" (185) "**apoptosis**" (145) "**induced**" (124) "**activity**" (111) "**gene**" (108) "**human**" (97) "**protein**" (95) "**c**" (80) "**growth**" (70) "**tumor**" (66) "**treatment**" (63) "**dna**", "**proliferation**" (62) "**cancer**" (55) "**l**" (54) "**h**" (53) "**p**", "**bcl**" (50) "**activation**", "**mrna**" (49) "**assay**" (46) "**dependent**", "**receptor**" (45) "**increased**", "**binding**", "**activated**" (44) "**inhibited**", "**anti**", "**transfected**" (42) "**factor**", "**level**", "**promoter**" (41) "**apoptotic**" (39) "**lines**" (38) "**mediated**" (37) "**inhibition**" (36) "**g**", "**role**" (35) "**cell lines**" (33) "**cell line**" (29) "**nf kappab**" (27) "**cell death**", "**dependent manner**", "**induced apoptosis**" (25) "**mkn 45**" (24) "**gastric cancer**", "**cell proliferation**" (23) "**c science**" (21) "**cell cycle**" (20) "**cancer cells**", "**western blot**", "**tumor cells**" (19) "**cytochrome c**", "**cell growth**", "**endothelial cells**" (18) "**apoptosis induced**", "**gene expression**", "**p 01**", "**p 05**" (17) "**epithelial cells**", "**cancer cell**", "**telomerase activity**", "**mg l**" (16) "**mol l**", "**sgc7901 vcr**", "**rt pcr**", "**dose dependent**", "**45 cells**" (14) "**mkn 45 cells**" (14) "**dose dependent manner**" (11) "**gastric cancer cells**", "**anterior polar cataracts**" (9) "**tpa vp 16**", "**green tea polyphenols**", "**nasopharyngeal epithelial cells**", "**apoptotic cell death**", "**agarose gel electrophoresis**", "**time dependent manner**", "**nf kappab activation**", "**hl 60 cells**" (7)

Focuses on the physiology of cells, genes, and human proteins to detect and treat cancers with emphasis on gastric cancer, anterior polar cataracts, and epithelial cells.

Cluster 8 [94]

"**system**", "**control**" (159) "**systems**" (113) "**power**" (70) "**time**" (67) "**paper**" (63) "**method**" (59) "**controller**" (57) "**optimal**" (49) "**based**" (48) "**stability**", "**state**" (45) "**design**" (44) "**linear**" (40) "**chaotic**" (36) "**model**" (35) "**feedback**" (34) "**two**" (33) "**robust**" (30) "**new**", "**scheme**" (28) "**simulation**", "**discrete**" (26) "**neural**" (25) "**c**", "**network**" (24) "**fuzzy**" (23) "**output**" (22) "**conditions**", "**solution**", "**adaptive**" (21) "**numerical**", "**algorithm**", "**voltage**", "**learning**" (19) "**power system**" (22) "**neural network**" (16) "**c science**" (15) "**optimal control**", "**h infinity**" (13) "**state feedback**", "**control system**", "**time varying**", "**chaotic systems**" (11) "**power systems**", "**time delay**" (10) "**control scheme**", "**dynamical systems**", "**closed loop**", "**impulsive**

control" (9) "**chaos control**", "**linear matrix**", "**control systems**" (8) "**control law**", "**feedback control**", "**chaotic system**", "**discrete time**" (7) "**closed loop system**", "**science b v**", "**c science b**", "**copyright c sons**" (6) "**neural network models**", "**mr fluid damper**", "**linear matrix inequality**" (5) "**semi active control**", "**impulsive control systems**", "**robust h infinity**", "**time varying delays**", "**h infinity control**", "**matrix inequality lmi**", "**machine power system**", "**h infinity controller**", "**multi machine power**", "**two block l**" (4)

Focuses on control system theory and feedback methods for applied applications using neural networks, fuzzy logic, in the following systems such as power, time, chaotic, closed loop, and control.

Cluster 9 [86]

"**patients**" (526) "**p**" (132) "**treatment**" (130) "**group**" (95) "**methods**" (72) "**mean**" (69) "**two**" (58) "**c**" (55) "**n**" (54) "**months**" (53) "**groups**", "**mg**" (50) "**one**" (48) "**patient**" (47) "**disease**" (46) "**survival**" (45) "**acute**" (41) "**rate**" (40) "**surgery**" (39) "**l**", "**age**" (38) "**chinese**" (37) "**objective**", "**years**", "**dose**" (36) "**type**", "**days**" (35) "**function**", "**vs**", "**12**" (34) "**s**", "**duration**" (33) "**15**", "**13**" (32) "**levels**" (31) "**range**", "**cancer**", "**follow**" (30) "**p 001**" (27) "**p 05**" (24) "**hong kong**" (21) "**p 01**" (19) "**mean age**" (18) "**peritoneal dialysis**", "**acute cholangitis**" (14) "**patients received**", "**one patient**" (12) "**chinese patients**", "**long term**", "**esmolol infusion**" (11) "**urea clearance**", "**ldl c**" (10) "**six patients**", "**creatinine clearance**", "**laryngeal function**", "**ambulatory peritoneal**", "**continuous ambulatory**", "**seizure duration**", "**four patients**", "**nasopharyngeal carcinoma**", "**months range**", "**three patients**", "**two patients**", "**peg el**" (9) "**ambulatory peritoneal dialysis**", "**continuous ambulatory peritoneal**" (9) "**recurrent acute cholangitis**" (8) "**bone uptake rate**", "**sm 153 edtmp**" (7) "**beta blocker nitrate**", "**peg el solution**", "**laryngeal function preserved**", "**acute testicular torsion**" (6) "**weighted magnetic resonance**", "**dose maintenance phase**", "**peritoneal dialysis capd**", "**diffusion weighted magnetic**", "**magnetic resonance imaging**", "**overall response rate**", "**tonic clonic signs**", "**atorvastatin mg d**", "**bell s palsy**" (5)

Focuses on methods and treatments of Chinese patients with various diseases such as nasopharyngeal carcinoma, acute cholangitis, acute testicular torsion, by comparing the different doses, and various other factors.

Cluster 10 [86]

"**dielectric**" (172) "**temperature**" (130) "**ceramics**" (122) "**phase**" (112) "**properties**" (88) "**constant**" (63) "**x**" (57) "**transition**", "**high**", "**field**" (49) "**o**", "**low**" (48) "**piezoelectric**" (46) "**sintering**" (45) "**ferroelectric**" (44) "**structure**" (40) "**sintered**" (32) "**doped**", "**t**" (30) "**content**" (29) "**electric**" (28) "**samples**" (27) "**pb**", "**induced**", "**ceramic**", "**loss**" (26) "**frequency**" (24) "**material**", "**r**", "**glass**" (23) "**system**", "**c**", "**epsilon**", "**batio3**" (22) "**based**", "**increasing**", "**tetragonal**" (21) "**phases**", "**room**", "**materials**" (20) "**dielectric constant**" (58) "**dielectric properties**" (50) "**phase**

transition" (38) "**dielectric loss**", "**electric field**" (20) "**room temperature**" (19) "**3nb2 o**", "**x ray**" (17) "**ray diffraction**" (16) "**low dielectric**" (15) "**sintering temperature**" (14) "**low temperature**", "**dc bias**" (12) "**mg1 3nb2**", "**bias field**", "**field induced**" (11) "**glass ceramics**" (10) "**epsilon r**", "**electrical properties**", "**piezoelectric properties**", "**hydrostatic pressure**" (9) "**microwave dielectric**", "**constant dielectric**", "**pb mg1**", "**high temperature**", "**phase boundary**", "**ceramics sintered**", "**ferroelectric ceramics**", "**temperature coefficient**" (8) "**x ray diffraction**" (16) "**mg1 3nb2 o**" (11) "**pb mg1 3nb2**", "**dielectric constant dielectric**" (8) "**low dielectric constant**", "**constant dielectric loss**" (7) "**equal toxless equal**", "**structure dielectric properties**", "**dc bias field**", "**microwave dielectric properties**", "**low dielectric loss**", "**toxless equal to0**" (6) "**ray diffraction xrd**", "**dielectric properties samples**", "**bias field induced**", "**dielectric constant low**", "**pb zn1 3nb2**" (5)

Focuses on low temperature effects on sintering & dielectric properties of ceramics (ferroelectric, and glass) and piezoelectric materials using XRD to analyze these properties.

Cluster 11 [76]

"**n**" (92) "**reaction**" (91) "**c**" (88) "**energy**" (84) "**b3lyp**" (56) "**mol**", "**clusters**" (52) "**structures**" (51) "**level**" (50) "**basis**" (46) "**calculations**" (45) "**stable**" (44) "**structure**" (42) "**potential**", "**theory**" (40) "**energies**" (39) "**density**", "**bond**" (37) "**transition**", "**31g**", "**isomers**" (35) "**state**" (34) "**g**" (33) "**d**" (32) "**two**" (31) "**b**", "**v**" (30) "**method**" (29) "**science**", "**o**", "**vibrational**", "**h**", "**mp2**" (28) "**s**", "**surface**", "**kj**" (27) "**states**", "**functional**" (26) "**hydrogen**" (25) "**c science**" (28) "**b v**", "**science b**", "**kj mol**" (27) "**density functional**", "**ab initio**" (24) "**potential energy**" (23) "**kcal mol**", "**basis set**" (22) "**311 g**" (21) "**energy surface**", "**ground state**" (19) "**functional theory**" (18) "**basis sets**" (17) "**transition states**" (16) "**vibrational frequencies**", "**n n**" (15) "**b3lyp 31g**", "**d p**" (13) "**qcisd t**", "**global minimum**" (11) "**31g level**", "**b3lyp 311**", "**single point**" (10) "**c s**", "**good agreement**", "**n clusters**" (9) "**science b v**", "**c science b**" (27) "**potential energy surface**" (19) "**density functional theory**" (18) "**b3lyp 311 g**" (10) "**ab initio calculations**" (8) "**311g d p**", "**d p level**", "**functional theory dft**" (7) "**o delta g**" (6) "**b3lyp 31g level**", "**311 g 3df**", "**311 g level**", "**c2h3 o delta**" (5)

Focuses on the study of atomic and molecular properties of b3lyp (benzoylcyclohexanedione).

Cluster 12 [74]

"**x**" (183) "**n**" (182) "**t**" (164) "**f**" (110) "**m**" (83) "**k**" (77) "**r**" (76) "**i**" (69) "**p**" (67) "**equal**" (60) "**s**", "**c**" (56) "**u**" (50) "**z**" (43) "**d**", "**bar**" (41) "**h**" (37) "**element**", "**g**" (36) "**l**", "**b**", "**paper**" (33) "**sigma**", "**let**" (32) "**infinity**" (29) "**solutions**", "**j**" (26) "**two**", "**e**", "**tau**" (24) "**science**" (23) "**equation**", "**y**" (22) "**function**", "**space**", "**set**", "**lambda**" (21) "**v**", "**q**", "**theta**" (20) "**c science**" (23) "**x t**" (22) "**r n**" (20) "**n n**" (18) "**x n**" (17) "**t x**"

(16) "**t t**", "**i n**", "**f x**" (15) "**n equal**", "**m bar**", "**x x**" (14) "**n bar**" (13) "**x y**" (12) "**p n**", "**t k**", "**u u**" (11) "**n p**", "**sigma i**", "**m theta**" (10) "**u t**", "**equal n**" (9) "**k x**", "**n x**", "**theta z**", "**x m**", "**f i**" (8) "**s m circle**", "**m circle minus**", "**t x t**" (7) "**m theta z**", "**c science usa**", "**t equal t**", "**sigma i n**" (6) "**n n n**", "**n p n**", "**s r n**", "**n x n**", "**i n i**" (5)

Focuses on mathematics symbol notations commonly associated with statistics.

Cluster 13 [68]

"**solutions**" (55) "**equations**", "**existence**" (48) "**paper**" (41) "**c**" (37) "**science**" (35) "**boundary**" (32) "**conditions**" (31) "**stability**" (30) "**solution**", "**global**" (29) "**t**" (25) "**sufficient**", "**u**" (24) "**differential**" (23) "**nonlinear**" (22) "**system**" (21) "**n**" (20) "**positive**" (19) "**method**" (18) "**value**" (17) "**order**", "**periodic**", "**exponential**" (16) "**systems**" (15) "**asymptotic**" (14) "**equilibrium**" (13) "**theory**", "**class**", "**delays**" (12) "**condition**", "**established**", "**model**", "**equation**" (11) "**c science**" (35) "**sufficient conditions**" (20) "**differential equations**" (17) "**boundary value**" (15) "**exponential stability**" (12) "**positive solutions**", "**science usa**" (10) "**existence uniqueness**" (9) "**asymptotic stability**", "**neural networks**" (8) "**u t**", "**u u**", "**periodic solutions**" (7) "**second order**", "**existence solutions**", "**activation functions**", "**global exponential**", "**t t**" (6) "**closed loop**", "**necessary sufficient**", "**existence positive**", "**n equal**", "**conditions existence**", "**difference systems**", "**upper lower**", "**global asymptotic**", "**equal n**", "**global existence**", "**partial differential**", "**order differential**" (5) "**c science usa**" (10) "**global exponential stability**" (6) "**sufficient conditions existence**", "**global asymptotic stability**" (5) "**closed loop system**", "**order differential equations**", "**upper lower solutions**", "**u t t**", "**partial differential equations**" (4)

Focuses on the terminology associated with applied mathematic boundary value problems such as those used in neural networks.

Cluster 14 [66]

"**protein**" (129) "**gene**" (80) "**human**" (74) "**expression**" (72) "**sequence**" (69) "**amino**" (64) "**cdna**" (60) "**expressed**" (57) "**acid**" (50) "**c**" (42) "**recombinant**" (38) "**n**" (37) "**terminal**" (34) "**activity**" (33) "**proteins**", "**fusion**" (31) "**purified**" (30) "**domain**" (28) "**isolated**", "**cells**" (27) "**coli**" (26) "**binding**" (25) "**two**", "**cloned**", "**brain**", "**plants**" (23) "**molecular**" (22) "**pcr**", "**plasmid**" (21) "**e**", "**acids**" (20) "**genes**", "**gst**" (19) "**first**", "**bp**" (18) "**amino acid**" (39) "**n terminal**" (23) "**acid sequence**", "**fusion protein**" (20) "**amino acids**" (19) "**e coli**" (15) "**full length**", "**c science**" (14) "**rt pcr**" (12) "**escherichia coli**", "**cdna library**" (11) "**expression vector**", "**zinc finger**" (10) "**gmp reductase**", "**northern blot**" (9) "**sds page**", "**pgex 4t**" (8) "**amino acid sequence**" (20) "**amino acid residues**", "**camphor fe sod**", "**c science usa**" (7) "**expressed escherichia coli**", "**human fetal brain**", "**n terminal amino**", "**open reading frame**", "**deduced amino acid**", "**full length cdna**" (6) "**science b v**", "**c science b**", "**human gmp**

reductase", "**c albicans mvd**", "**ig v c**", "**gsk 3alpha 3beta**", "**hb7 ig v**", "**terminal amino acid**" (5)

Focuses on genetic sequencing and molecular biology of proteins, genes, amino acids, cells including those of human fetal brains, plants and escherichia coli.

Cluster 15 [66]

"**model**" (270) "**models**" (71) "**flow**" (56) "**data**" (39) "**c**" (37) "**paper**" (33) "**two**" (32) "**traffic**" (29) "**based**", "**turbulence**" (28) "**s**", "**large**", "**numerical**" (27) "**scale**", "**linear**", "**simulation**" (25) "**science**" (24) "**method**" (23) "**time**" (22) "**non**" (21) "**one**", "**experimental**" (20) "**size**", "**structure**", "**noise**" (19) "**three**", "**velocity**" (18) "**new**" (17) "**v**", "**distribution**", "**algorithm**", "**simulate**", "**combustion**" (16) "**complex**", "**transport**", "**sediment**" (15) "**c science**" (23) "**traffic flow**" (14) "**b v**", "**science b**" (11) "**food web**", "**large eddy**", "**model simulate**" (9) "**linear models**", "**experimental data**" (8) "**soil respiration**", "**balance model**" (7) "**ecosystem models**", "**size distribution**", "**tangent linear**", "**three dimensional**", "**eddy simulation**", "**non linear**", "**subgrid scale**", "**numerical model**" (6) "**science b v**" (11) "**c science b**" (10) "**large eddy simulation**" (6) "**eddy simulation les**" (5) "**necessary sufficient conditions**", "**sensitivity soil respiration**", "**temperature sensitivity soil**", "**k epsilon model**", "**m s model**", "**heavy metal vaporization**", "**three species food**", "**copyright c sons**" (4)

Focuses on modeling algorithms used in fluid dynamics, and ecosystems.

Cluster 16 [64]

"**method**" (122) "**numerical**" (56) "**linear**" (50) "**equations**" (47) "**non**" (42) "**solution**" (39) "**equation**" (37) "**solutions**" (34) "**two**" (33) "**boundary**", "**paper**" (31) "**system**", "**c**" (30) "**science**" (26) "**element**" (25) "**model**" (24) "**domain**" (23) "**time**" (22) "**finite**", "**algorithm**", "**elastic**" (21) "**based**", "**new**" (20) "**s**", "**order**" (18) "**methods**", "**solving**", "**nonlinear**" (17) "**type**" (16) "**conditions**", "**response**", "**wave**", "**integral**" (15) "**one**", "**energy**", "**dimensional**", "**fluid**" (14) "**non linear**", "**c science**" (25) "**finite element**" (13) "**element method**" (12) "**least squares**" (10) "**degenerate scale**", "**numerical examples**" (9) "**boundary conditions**" (8) "**method solving**", "**b v**", "**science b**" (7) "**sneddon muki**", "**time domain**", "**numerical method**", "**one dimensional**" (6) "**domain method**", "**method solve**", "**numerical experiments**", "**trust region**", "**two dimensional**", "**boundary integral**", "**good agreement**", "**two phase**", "**optimal error**", "**navier stokes**", "**artificial boundary**", "**linear evolution**" (5) "**science b v**", "**finite element method**", "**c science b**" (7) "**time domain method**" (5) "**order non linear**", "**navier stokes equations**", "**copyright c sons**", "**stochastic averaging method**", "**stationary probability density**" (4)

Focuses on linear and non-linear numerical methods for applied mathematics such as finite element analysis, least squares, navier stokes, time domain method, and stochastic averaging method.

Cluster 17 [62]

"**d**" (106) "**beta**" (94) "**o**" (82) "**new**" (66) "**isolated**" (59) "**structures**", "**compounds**" (37) "**c**", "**alpha**", "**elucidated**" (34) "**glucopyranosyl**" (33) "**spectroscopic**" (31) "**b**" (30) "**l**" (29) "**two**" (28) "**spectral**", "**nmr**" (23) "**basis**", "**structure**", "**methods**", "**acid**" (20) "**h**", "**chemical**", "**glucopyranoside**" (19) "**compound**" (17) "**2d**" (15) "**xylopyranosyl**" (14) "**12**", "**rhamnopyranosyl**" (13) "**x**", "**ray**", "**ic50**", "**named**" (12) "**beta d**" (90) "**o beta**" (42) "**d glucopyranosyl**" (31) "**two new**" (21) "**alpha l**" (20) "**d glucopyranoside**" (19) "**structures elucidated**" (18) "**d xylopyranosyl**", "**2d nmr**" (14) "**x ray**", "**xylopyranosyl beta**", "**l rhamnopyranosyl**", "**spectroscopic methods**" (12) "**glucopyranosyl beta**" (11) "**o alpha**", "**mug ml**" (10) "**c science**", "**28 o**", "**rhamnopyranosyl beta**" (9) "**nmr techniques**", "**elucidated basis**", "**alpha d**" (8) "**basis spectroscopic**", "**d galactopyranosyl**", "**structure elucidated**", "**basis spectral**", "**b isolated**", "**d galactopyranoside**" (7) "**o beta d**" (41) "**beta d glucopyranosyl**" (30) "**beta d glucopyranoside**" (17) "**beta d xylopyranosyl**" (14) "**alpha l rhamnopyranosyl**", "**xylopyranosyl beta d**", "**d xylopyranosyl beta**" (12) "**glucopyranosyl beta d**", "**d glucopyranosyl beta**" (11) "**rhamnopyranosyl beta d**" (9) "**l rhamnopyranosyl beta**", "**28 o beta**", "**o alpha l**" (8) "**2d nmr techniques**", "**beta d galactopyranosyl**" (7) "**o benzoyl alpha**", "**26 o beta**", "**beta d galactopyranoside**", "**benzoyl alpha d**" (6)

Focuses on the characterization of glucopyranosyl-like compounds and structures using spectroscopic techniques.

Cluster 18 [57]

"**electrode**" (116) "**surface**" (52) "**x**" (49) "**c**" (48) "**modified**" (45) "**v**" (40) "**b**" (38) "**science**" (37) "**gold**" (33) "**response**" (32) "**l**", "**m**" (30) "**method**" (29) "**electrochemical**" (28) "**s**", "**solution**" (26) "**mol**" (25) "**adsorption**", "**concentration**" (23) "**rate**", "**range**", "**detection**", "**ph**" (22) "**films**" (21) "**electron**", "**ion**", "**self**", "**quartz**" (20) "**crystal**", "**k**", "**process**", "**sensor**", "**assembled**" (19) "**two**", "**potential**", "**transfer**", "**acid**", "**binding**", "**reduction**" (17) "**c science**" (37) "**b v**", "**science b**" (32) "**mol l**" (20) "**modified electrode**" (19) "**self assembled**", "**quartz crystal**" (17) "**electron transfer**" (15) "**gold electrode**" (14) "**x mol**" (13) "**electrode surface**" (12) "**detection limit**", "**fe cn**" (11) "**cyclic voltammetry**", "**modified gold**", "**x m**" (10) "**new method**" (8) "**constant k**", "**assembled monolayers**", "**piezoelectric quartz**", "**aqueous solution**", "**transfer rate**", "**sol gel**", "**x cm**" (7) "**science b v**", "**c science b**" (32) "**x mol l**" (10) "**piezoelectric quartz crystal**", "**modified gold electrode**", "**electron transfer rate**" (7) "**self assembled monolayers**", "**quartz crystal microbalance**", "**x cm s**", "**glassy carbon electrode**" (6) "**detection limit x**", "**x x mol**", "**rate constant k**" (5)

"**dhp pdda films**", "**quartz crystal impedance**", "**fe cn fe**", "**cn fe cn**", "**self assembled monolayer**", "**pair redox waves**" (4)

Focuses on techniques such as sol-gel and piezoelectric quartz crystals used to characterize surface properties of electrodes.

Cluster 19 [49]

"**laser**" (94) "**optical**" (52) "**power**", "**wavelength**" (41) "**nm**" (36) "**c**" (34) "**fiber**" (28) "**nd**", "**output**" (24) "**pumped**" (23) "**frequency**", "**single**", "**pump**" (20) "**mode**" (19) "**science**", "**conversion**", "**yag**" (18) "**absorption**", "**efficiency**", "**diode**" (17) "**pulse**" (16) "**temperature**", "**crystal**", "**mw**" (15) "**two**", "**experimental**", "**emission**", "**mum**" (14) "**n**", "**cm**", "**w**", "**signal**", "**cavity**", "**lasing**" (13) "**light**", "**v**", "**high**", "**measured**", "**dye**", "**pulses**" (12) "**c science**" (18) "**nd yag**", "**yag laser**" (12) "**b v**", "**science b**" (11) "**nd yvo4**" (9) "**optical america**", "**output power**", "**c optical**", "**laser diode**" (8) "**two photon**", "**diode pumped**", "**frequency doubling**", "**conversion efficiency**" (7) "**optical parametric**", "**532 nm**", "**q switched**" (6) "**wavelength conversion**", "**photon absorption**", "**yvo4 laser**", "**experimental c**", "**pump power**", "**semiconductor optical**", "**frequency doubled**", "**fabry perot**", "**periodically poled**", "**single pass**", "**laser induced**", "**nm wavelength**" (5) "**science b v**", "**nd yag laser**", "**c science b**" (11) "**c optical america**" (8) "**nd yvo4 laser**" (5) "**x 20 cm**", "**two photon absorption**", "**experimental c science**" (4)

Focuses on properties of lasers and optics, emphasizing nd yag lasers.

Cluster 20 [46]

"**size**", "**tio2**" (59) "**particle**" (44) "**gel**" (43) "**phase**", "**temperature**" (37) "**surface**" (36) "**sol**" (32) "**powders**", "**powder**" (30) "**xrd**" (26) "**photocatalytic**" (25) "**activity**", "**process**" (24) "**method**" (23) "**films**", "**structure**", "**crystalline**" (19) "**degreesc**", "**nm**", "**area**", "**anatase**" (17) "**reaction**", "**phosphor**" (16) "**x**", "**properties**", "**sio2**", "**ray**", "**tem**", "**glass**", "**combustion**" (15) "**high**", "**synthesized**" (14) "**specific**", "**particles**", "**precursor**", "**water**" (13) "**particle size**", "**sol gel**" (28) "**photocatalytic activity**" (17) "**surface area**" (16) "**x ray**" (15) "**specific surface**" (12) "**c science**", "**gel process**", "**gel method**" (10) "**pore size**", "**b v**", "**science b**" (9) "**thin films**", "**ray diffraction**" (8) "**citric acid**", "**diffraction xrd**", "**tio2 thin**" (7) "**solid state**", "**state reaction**", "**ft ir**", "**grain size**" (6) "**specific surface area**" (12) "**sol gel process**" (10) "**science b v**", "**c science b**", "**sol gel method**" (9) "**x ray diffraction**" (8) "**solid state reaction**", "**ray diffraction xrd**" (6) "**differential thermal dta**", "**synthesized sol gel**" (5) "**tio2 thin films**", "**x ray photoelectron**", "**titanyl organic compound**", "**bi4 xlax ti3o12**", "**powders sol gel**" (4)

Focuses on characterizing the properties of Titanium dioxide (TiO2) microstructure materials such as particles, powders, crystallines, and thin films using sol-gel and XRD techniques.

Cluster 21 [45]

"**algorithm**" (129) "**based**" (41) "**method**" (40) "**paper**" (39) "**algorithms**" (36) "**new**", "**fuzzy**" (24) "**model**" (22) "**optimization**" (21) "**genetic**" (19) "**line**", "**data**" (18) "**c**", "**solution**" (17) "**science**", "**variables**", "**simulation**" (16) "**set**", "**network**", "**variable**" (15) "**one**", "**efficient**" (14) "**function**" (13) "**process**", "**search**" (12) "**dynamic**", "**methods**", "**objective**", "**local**", "**adaptive**", "**learning**" (11) "**v**", "**time**", "**linear**", "**lines**", "**matching**", "**clustering**" (10) "**c science**" (15) "**genetic algorithm**" (11) "**b v**", "**science b**", "**algorithm based**" (9) "**new algorithm**" (7) "**coalbed methane**" (6) "**algorithms based**", "**genetic algorithms**", "**hidden variables**", "**methane reservoirs**" (5) "**neural network**", "**clustering algorithms**", "**paper proposes**", "**feature point**", "**switching regression**", "**fuzzy clustering**", "**fuzzy decision**", "**input variable**", "**invisible lines**", "**least squares**", "**point matching**", "**optimization algorithm**", "**winc algorithm**", "**sensitive input**", "**quasi dense**" (4) "**science b v**", "**c science b**" (9) "**coalbed methane reservoirs**" (5) "**feature point matching**" (4) "**quasi dense matching**", "**recursive least squares**", "**finite element method**", "**fuzzy decision method**", "**algorithm c science**", "**sensitive input variable**", "**fuzzy clustering algorithms**" (3)

Focuses on algorithms such as adaptive genetic, neural network, fuzzy logic, and winc .

Cluster 22 [43]

"**magnetic**" (94) "**temperature**" (93) "**x**" (88) "**t**" (60) "**c**" (51) "**transition**" (46) "**field**" (40) "**phase**" (37) "**k**" (32) "**compounds**" (28) "**increasing**" (25) "**ferromagnetic**", "**magnetization**" (24) "**properties**", "**dependence**" (22) "**electron**", "**v**", "**low**", "**temperatures**" (19) "**s**", "**spin**", "**content**", "**mn**", "**resistivity**" (18) "**samples**", "**transitions**" (17) "**magnetoresistance**" (16) "**b**", "**induced**", "**decreases**", "**fe**" (15) "**state**", "**volume**", "**n**", "**structural**", "**co**", "**mr**", "**curie**" (14) "**t c**" (18) "**magnetic field**" (15) "**magnetic properties**" (14) "**temperature t**", "**c science**" (13) "**temperature dependence**", "**curie temperature**" (12) "**t n**" (11) "**magnetic phase**", "**b v**", "**science b**" (10) "**temperature range**", "**phase transitions**" (9) "**american physics**", "**c american**", "**field induced**", "**compounds x**" (8) "**low temperatures**", "**spin reorientation**", "**phase transition**", "**room temperature**", "**first order**" (7) "**t p**", "**magnetic entropy**", "**magnetoresistance mr**", "**fe mn**", "**magnetic fields**", "**m s**", "**martensitic transformation**" (6) "**science b v**", "**c science b**" (10) "**c american physics**" (8) "**temperature t c**", "**magnetic phase transitions**" (7) "**curie temperature t**" (5) "**mn based alloys**" (4) "**increasing v content**", "**fe mn based**", "**temperature dependence resistivity**", "**lafe11 5si1 5h1**", "**gd si1 xgex**", "**unit cell volume**", "**t n decreases**", "**increasing magnetic field**", "**fm clusters co**", "**transition temperature t**" (3)

Focuses on the effects of temperature on various magnetic properties associated with compounds.

Cluster 23 [41]

"**polymerization**" (113) "**weight**" (47) "**molecular**" (46) "**reaction**" (43) "**monomer**" (39) "**c**" (37) "**temperature**" (31) "**polymer**" (30) "**n**" (29) "**coupling**", "**catalyst**" (28) "**concentration**" (26) "**g**", "**initiator**" (24) "**graft**" (23) "**ratio**", "**synthesized**" (22) "**high**", "**st**" (21) "**p**", "**efficiency**" (20) "**copolymer**", "**conversion**" (19) "**activity**", "**h**", "**grafting**" (18) "**x**", "**ps**", "**nmr**" (17) "**rate**", "**m**", "**radical**" (16) "**higher**", "**pp**" (15) "**process**", "**time**", "**co**", "**poly**", "**styrene**", "**copolymerization**" (14) "**molecular weight**" (37) "**c science**", "**metallocene catalyst**", "**average molecular**", "**coupling efficiency**" (10) "**monomer conversion**" (9) "**g ps**", "**h nmr**", "**reaction temperature**", "**radical polymerization**" (8) "**polymerization temperature**", "**coupling reaction**" (7) "**molecular weights**", "**methyl methacrylate**", "**reaction time**", "**graft polymerization**", "**branching number**", "**glass transition**", "**emulsion polymerization**", "**polymerization rate**", "**microemulsion polymerization**" (6) "**average molecular weight**" (7) "**psf g ps**", "**atom transfer radical**", "**c 13 nmr**" (5) "**c science b**", "**ultrasonically initiated emulsion**", "**weight average molecular**", "**glass transition temperature**", "**initiated emulsion polymerization**", "**differential scanning calorimetry**", "**molecular weight distribution**", "**science b v**" (4)

Focuses on the properties and effects of polymerization and polymers.

Cluster 24 [38]

"**expression**" (131) "**p**", "**hcc**" (97) "**cells**" (77) "**cancer**" (75) "**patients**", "**tumor**" (74) "**vegf**" (73) "**cell**" (51) "**gastric**" (49) "**05**" (37) "**cases**" (34) "**positive**", "**carcinoma**", "**mrna**" (31) "**normal**" (30) "**tissues**" (29) "**human**" (28) "**higher**", "**liver**" (27) "**factor**" (26) "**stage**" (25) "**protein**", "**serum**", "**detected**", "**lines**" (24) "**levels**", "**survival**" (23) "**methods**", "**tissue**" (22) "**growth**", "**metastasis**", "**staining**", "**beta**" (20) "**non**", "**assay**" (19) "**grade**", "**tgf**" (18) "**p 05**" (35) "**cell lines**" (24) "**tgf beta**" (17) "**hepatocellular carcinoma**" (16) "**hcc patients**" (15) "**breast cancer**", "**p 01**", "**colorectal cancer**" (14) "**lymph node**", "**gastric cancer**", "**carcinoma hcc**" (13) "**vegf expression**", "**growth factor**", "**non cancer**" (12) "**inos vegf**", "**cik cells**", "**hcc cell**", "**p28 gankyrin**", "**free survival**" (11) "**cell line**" (10) "**p 001**", "**cancer cell**", "**cancer patients**" (9) "**erbeta protein**", "**effector cells**", "**bone formation**", "**vascular endothelial**", "**expression vegf**", "**gastric carcinoma**", "**western blot**" (8) "**hepatocellular carcinoma hcc**" (13) "**lymph node metastasis**", "**cancer cell lines**", "**disease free survival**", "**hcc cell lines**" (7) "**expression p28 gankyrin**", "**human breast cancer**", "**ifn alpha 2b**", "**endothelial growth factor**", "**growth factor vegf**", "**vascular endothelial growth**" (6) "**class i antigens**", "**expressions inos vegf**", "**hla class i**", "**peripheral blood mononuclear**", "**non cancer patients**", "**blood mononuclear cells**", "**p28 gankyrin mrna**" (5)

Focuses on the physiology of cells, proteins, and tissues and their relation to various forms of cancer in humans such as gastric cancer, hepatocellular carcinoma, breast cancer, liver cancer.

Cluster 25 [38]

"**ion**" (74) "**implantation**" (56) "**x**" (48) "**ions**" (47) "**cm**" (42) "**c**", "**irradiation**" (35) "**energy**" (31) "**implanted**" (25) "**science**", "**v**", "**dose**" (23) "**b**", "**surface**" (22) "**samples**", "**high**" (21) "**annealing**" (19) "**temperature**", "**irradiated**" (18) "**nm**", "**vacuum**" (17) "**silicon**", "**loss**", "**fluence**" (16) "**electron**", "**formation**", "**electronic**", "**layer**", "**absorption**", "**mev**" (15) "**range**", "**sample**", "**si**", "**spectroscopy**", "**glass**", "**kev**", "**pet**" (13) "**ion implantation**" (35) "**c science**" (23) "**b v**", "**science b**" (22) "**ions cm**" (16) "**energy loss**", "**electronic energy**" (14) "**refractive index**" (11) "**room temperature**" (10) "**mua cm**", "**ion flux**" (9) "**ion dose**", "**x 17**" (8) "**17 cm**", "**x 16**", "**x ray**", "**neutron irradiation**" (7) "**x 12**", "**uv vis**", "**kev nm**", "**ultraviolet visible**" (6) "**science b v**", "**c science b**" (22) "**electronic energy loss**" (14) "**x 17 cm**" (7) "**12 ions cm**", "**x 16 x**", "**fourier transform infrared**", "**x 12 ions**", "**transform infrared ftir**" (5) "**x 15 ions**", "**x ray diffraction**", "**vapor vacuum arc**", "**metal vapor vacuum**", "**silicon insulator soi**", "**range straggling lateral**", "**15 ions cm**", "**x x 12**", "**transmission electron microscopy**", "**50 mua cm**" (4)

Focuses on effects of ion implantation into silicon layers using metal vapor vacuums and analyzing the effects via FTIR and UV visible spectroscopic techniques.

Cluster 26 [37]

"**emission**" (43) "**two**" (34) "**c**" (33) "**pl**" (32) "**n**" (29) "**excitation**" (28) "**light**" (27) "**v**" (24) "**b**" (23) "**alq**" (22) "**spectra**", "**nm**", "**layer**", "**efficiency**", "**red**" (21) "**science**", "**state**" (19) "**quantum**", "**luminescence**", "**device**" (18) "**energy**", "**transfer**", "**blue**" (17) "**temperature**", "**dcm**" (16) "**photoluminescence**", "**excited**", "**emitting**" (15) "**doped**", "**fluorescence**", "**cd**" (14) "**properties**" (13) "**films**" (12) "**one**", "**states**", "**j**", "**peak**", "**devices**" (11) "**c science**" (19) "**b v**", "**science b**" (18) "**photoluminescence pl**", "**light emitting**" (12) "**cd m**", "**excited state**", "**energy transfer**", "**light emission**" (9) "**american physics**", "**c american**" (8) "**red emission**", "**n n**", "**quantum efficiency**", "**pl spectra**" (7) "**organic light**", "**emitting diodes**", "**sol gel**" (6) "**upconverted luminescence**", "**blue light**", "**quantum wells**", "**nh ch2**", "**ph nh**", "**blue red**", "**ch2 group**", "**transfer process**", "**room temperature**" (5) "**science b v**", "**c science b**" (18) "**c american physics**" (8) "**light emitting diodes**", "**organic light emitting**" (6) "**nh ch2 group**", "**ph nh ch2**" (5) "**tris hydroxyquinoline aluminum**", "**blue light emission**", "**n n bis**", "**energy transfer process**" (4) "**two photons excitation**", "**intramolecular charge transfer**", "**n n diphenyl**", "**device blue red**", "**blue red emission**", "**pl spectra gainnas**", "**hydroxyquinoline aluminum alq**", "**polymer light emitting**", "**multiple quantum wells**" (3)

Focuses on characterizing emission properties that occur in the study of photoluminescence devices.

Cluster 27 [34]

"**phase**" (99) "**temperature**" (40) "**alpha**" (35) "**alloy**" (32) "**transformation**" (19) "**structure**" (17) "**degreesc**", "**aging**" (16) "**electron**", "**martensite**" (15) "**ti**", "**high**", "**thermal**", "**precipitation**" (14) "**beta**" (13) "**transition**", "**matrix**", "**shape**", "**amorphous**" (12) "**s**", "**c**", "**h**", "**fe**", "**co**", "**xrd**", "**milling**", "**zn**", "**b2**" (11) "**m**", "**fraction**", "**cu**", "**memory**", "**nb**" (10) "**increase**", "**microscopy**", "**science**", "**temperatures**", "**grain**", "**solution**" (9) "**alpha phase**", "**shape memory**" (10) "**phase transition**", "**c science**", "**electron microscopy**" (8) "**x ray**" (7) "**grain size**", "**room temperature**", "**transmission electron**", "**memory alloy**" (6) "**b2 feal**", "**b v**", "**science b**", "**feal co**", "**amorphous phase**", "**strength elongation**", "**co matrix**", "**solid solution**" (5) "**shape memory alloy**" (6) "**b2 feal co**", "**science b v**", "**c science b**" (5) "**supersaturated solid solution**", "**diffusion solution zone**", "**feal co matrix**", "**solution zone alpha**", "**transmission electron microscopy**" (4) "**phase boundary sliding**", "**solid solution amorphous**", "**stress strain cycling**", "**n load indentation**", "**lost foam casting**", "**alpha phase alpha**", "**tensile strength elongation**", "**x ray diffraction**" (3)

Focuses on the material properties of various alloys (s, h, ti, fe, co, zn, b2, nb, cu).

Cluster 28 [33]

"**b**" (56) "**gamma**" (47) "**c**" (44) "**s**" (42) "**pi**" (40) "**phi**", "**decay**" (34) "**d**" (32) "**measured**", "**data**", "**detector**" (21) "**two**", "**mass**", "**decays**" (20) "**x**", "**e**", "**eta**", "**branching**" (18) "**model**" (17) "**gev**", "**quark**" (16) "**v**", "**sample**", "**j**" (15) "**state**" (14) "**k**", "**new**", "**ratio**" (13) "**collected**", "**chi**" (12) "**science**", "**find**", "**r**", "**psi**", "**bar**", "**mesons**", "**syst**", "**stat**" (11) "**mixing**", "**br**" (10) "**b v**", "**science b**", "**c science**", "**pi pi**" (11) "**pi gamma**" (10) "**j psi**", "**d s**", "**br phi**" (9) "**branching ratio**" (8) "**data sample**", "**decay widths**", "**b d**", "**b c**", "**e e**" (7) "**k pi**", "**d d**", "**e collider**" (6) "**standard model**", "**phi eta**", "**s 1535**", "**branching fractions**", "**k s**", "**phi etagamma**", "**s pi**", "**eta gamma**", "**chi c0**", "**final state**" (5) "**science b v**", "**c science b**" (11) "**e e collider**" (6) "**phi eta gamma**" (5) "**br phi pi**", "**pi pi gamma**", "**belle detector kekb**" (4)

Focuses on detecting and measuring the properties of nuclear particles, such as decay schemes and branching ratios.

Cluster 29 [33]

"**model**" (69) "**data**" (49) "**experimental**" (34) "**method**" (22) "**kinetic**" (19) "**reaction**" (18) "**good**" (15) "**pressure**", "**phase**", "**agreement**" (14) "**theoretical**" (13)

"**parameters**", "**speed**" (12) "**c**" (11) "**based**", "**system**", "**high**", "**comparison**", "**cos**", "**boiling**" (10) "**s**", "**mechanism**", "**hydrate**" (9) "**temperature**", "**measured**", "**distribution**", "**conversion**", "**source**", "**vessel**", "**concrete**" (8) "**experimental data**" (19) "**good agreement**" (10) "**agreement experimental**" (8) "**c science**" (7) "**relaxor ferroelectrics**", "**kinetic model**", "**theoretical model**", "**finite element**" (6) "**htr pressure**", "**cos hydrolysis**", "**experiment data**", "**pressure vessel**", "**methane hydrate**", "**neural network**" (5) "**reverberation data**", "**bistatic reverberation**", "**thermal conversion**", "**o ring**", "**model fit**" (4) "**good agreement experimental**", "**htr pressure vessel**" (5) "**nmr chemical shift**", "**coating optical fiber**", "**agreement experimental data**", "**strength concrete triaxial**", "**triaxial monotonic cyclic**", "**differential phase shift**", "**high strength concrete**", "**monotonic cyclic compressions**", "**flow reaction processes**", "**concrete triaxial monotonic**" (3)

Focuses on modeling methods for the kinetic behavior various physical properties.

Cluster 30 [33]

"**al2o3**" (55) "**sic**" (48) "**sintering**" (43) "**composites**" (35) "**temperature**" (24) "**composite**", "**particles**" (20) "**phase**", "**grain**" (19) "**matrix**" (18) "**properties**", "**density**" (17) "**strength**", "**powder**" (15) "**ceramics**", "**sintered**", "**tic**" (14) "**system**", "**c**", "**high**", "**addition**", "**time**", "**microstructure**" (13) "**mechanical**", "**reinforced**", "**wt**" (12) "**structure**", "**relative**", "**zro2**", "**aln**" (11) "**situ**", "**method**", "**dielectric**", "**boundary**", "**sem**", "**toughness**" (10) "**sintering temperature**" (10) "**mechanical properties**" (9) "**grain boundary**", "**relative density**" (8) "**al2o3 particles**" (6) "**situ al2o3**", "**al2o3 sic**", "**plasma sintering**", "**beta sialon**", "**fracture toughness**", "**functionally graded**", "**aln sic**", "**matrix composites**", "**spark plasma**", "**al2o3 matrix**", "**properties al2o3**" (5) "**spark plasma sintering**" (5) "**sic wt tic**", "**functionally graded materials**", "**aln sic solid**", "**sic solid solution**" (4) "**grain boundary phase**", "**adiabatic shear instability**", "**continuous casting bonding**", "**iron base composite**", "**mechanical properties al2o3**", "**second phase particle**", "**metal matrix composites**", "**casting bonding method**", "**situ al2o3 platelets**", "**r curve behavior**" (3)

Focuses on the microstructure properties of al203, composites, particles, powders, and ceramics.

Cluster 31 [32]

"**corrosion**" (122) "**solution**" (31) "**alloy**" (30) "**steel**" (26) "**resistance**", "**electrochemical**" (22) "**ph**" (18) "**pitting**" (17) "**polarization**", "**film**", "**coating**" (16) "**stress**", "**nacl**", "**passive**" (14) "**rate**", "**surface**", "**potential**", "**impedance**" (13) "**inhibition**", "**value**" (12) "**loss**", "**anodic**", "**erosion**", "**ss**", "**scc**" (11) "**formed**", "**acid**", "**weight**", "**fe**", "**inhibitor**", "**hcl**" (10) "**corrosion resistance**" (16) "**corrosion rate**", "**ph value**", "**weight loss**" (10) "**passive film**" (8) "**carbon steel**", "**mild steel**", "**pitting**

corrosion", "**nacl solution**", "**corrosion potential**" (7) "**electrochemical impedance**", "**corrosion behavior**", "**c science**", "**erosion corrosion**", "**sulphate solutions**", "**impedance spectroscopy**", "**inhibition efficiency**", "**pani tr**" (6) "**corrosion induced**", "**anodic polarization**", "**type 316l**", "**potentiodynamic polarization**", "**a3 steel**", "**underfilm corrosion**", "**dislocation emission**" (5) "**electrochemical impedance spectroscopy**" (6) "**pani tr composite**", "**stress corrosion cracking**", "**dislocation emission motion**", "**fe 30mn 6si**" (4) "**corrosion cracking scc**", "**science b v**", "**c science b**", "**ph value simulated**", "**corrosion induced stress**", "**simulated rain increasing**", "**induced tensile stress**", "**corrosion resistance alloy**", "**hcl aq surfactant**", "**oxidation hot corrosion**", "**corrosion potential e**", "**polarization electrochemical impedance**", "**type 316l ss**", "**impedance spectroscopy eis**", "**316l uns s31603**" (3)

Focuses on characterizing the corrosion resistance properties on surfaces, coatings, and films of various steel alloys.

Cluster 32 [31]

"**c**" (152) "**60**" (54) "**temperature**" (28) "**n**", "**t**" (22) "**fullerenes**" (15) "**s**", "**high**", "**coal**" (14) "**dielectric**", "**si**" (13) "**v**", "**gd**" (12) "**based**", "**method**", "**degreesc**", "**potential**" (11) "**science**", "**experimental**", "**nano**", "**ni**" (10) "**properties**", "**coefficient**", "**70**", "**powders**", "**loss**" (9) "**m**", "**frequency**", "**h**", "**process**", "**separation**", "**82**", "**equivalent**" (8) "**c 60**" (54) "**t c**" (15) "**c n**", "**c science**", "**si c**" (10) "**c 82**", "**high temperature**" (8) "**n nano**" (7) "**60 c**", "**b v**", "**science b**", "**c 80**", "**dielectric loss**", "**uv vis**", "**c 70**", "**tb3n c**" (6) "**temperature t**", "**gd c**", "**60 adducts**", "**vis nir**", "**equivalent tosi**" (5) "**si c n**" (10) "**c n nano**" (7) "**science b v**", "**c 60 c**", "**c science b**", "**60 c 70**", "**tb3n c 80**" (6) "**uv vis nir**", "**gd c 82**", "**c 60 adducts**" (5) "**c 60 films**", "**temperature t c**", "**alanine c 60**", "**n nano powder**", "**beta alanine c**" (4)

Focuses on the dielectric properties of microstructures such as fullerenes, powders, and nanoparticles of the following materials, si, gd, ni, carbon, and coal.

Cluster 33 [31]

"**complexes**" (56) "**spectra**" (36) "**n**" (29) "**fluorescence**", "**uv**" (25) "**synthesized**" (22) "**elemental**" (21) "**ir**", "**coordination**" (20) "**l**", "**h**", "**eu**" (19) "**ions**" (17) "**polymers**" (15) "**x**", "**nmr**" (14) "**polymer**", "**o**", "**complex**", "**acid**" (13) "**c**", "**temperature**", "**new**", "**co**" (11) "**copolymer**", "**fluorescent**", "**ligand**" (10) "**intensity**", "**m**", "**dna**", "**ii**", "**solution**", "**reaction**", "**cu2**" (9) "**concentration**", "**ion**", "**pa**", "**ph**", "**ft**", "**epu**" (8) "**h nmr**" (11) "**coordination polymer**" (9) "**eu pa**", "**n n**" (7) "**ir h**", "**coordination polymers**", "**room temperature**", "**ir uv**", "**d f**", "**fluorescence spectra**", "**ft ir**", "**pa complexes**" (6) "**mol l**", "**rare earth**", "**complexes elemental**", "**nmr spectra**" (5) "**eu pa complexes**", "**ir h nmr**" (6) "**h nmr spectra**" (5) "**d f transition**", "**concentration eu pa**", "**tc binary complex**" (4) "**p n ligands**", "**science b v**", "**c science b**", "**elemental ir**

uv", "**lncl nh o**", "**ir uv h**", "**pa complexes situ**", "**uv h nmr**", "**complexes situ synthesized**" (3)

Focuses on characterizing the properties of various polymer and copolymer complexes from their fluorescence spectra.

Cluster 34 [30]

"**pp**" (81) "**blends**" (77) "**g**" (36) "**composites**" (32) "**eva**" (27) "**gma**", "**content**" (26) "**properties**" (24) "**sebs**" (23) "**mechanical**", "**phase**" (22) "**scanning**", "**c**", "**matrix**" (20) "**morphology**", "**high**", "**structure**", "**strength**", "**ma**" (19) "**tensile**" (18) "**periodicals**", "**poe**" (17) "**impact**" (16) "**sem**", "**hdpe**" (15) "**s**", "**microscopy**", "**method**" (14) "**particles**", "**copolymer**", "**interfacial**", "**dsc**", "**styrene**", "**pmma**" (13) "**c periodicals**" (17) "**eva blends**" (16) "**g gma**" (15) "**g ma**" (13) "**tensile strength**", "**mechanical properties**" (11) "**electron microscopy**" (10) "**scanning calorimetry**", "**pp g**", "**sebs g**", "**scanning electron**", "**polypropylene pp**", "**radiation crosslinking**", "**differential scanning**" (9) "**sgf sebs**", "**ldpe eva**" (8) "**maleic anhydride**", "**hdpe eva**", "**density polyethylene**", "**injection molding**" (7) "**pesi m**", "**gma co**", "**microscopy sem**", "**viscosity pmma**", "**poe baso4**", "**interfacial interaction**", "**pp sf**", "**co st**", "**sf composites**", "**hips g**" (6) "**scanning electron microscopy**", "**differential scanning calorimetry**" (9) "**ldpe eva blends**", "**sebs g ma**" (8) "**pp g gma**", "**pp sf composites**", "**gma co st**", "**g gma co**", "**hdpe eva blends**" (6) "**scanning calorimetry dsc**", "**electron microscopy sem**", "**hips g gma**", "**packing injection molding**" (5) "**angle x ray**", "**size dispersed phase**", "**low density polyethylene**", "**epr g gma**", "**high viscosity pmma**", "**sgf sebs g**" (4)

Focuses on characterizing the mechanical properties of polypropylene (pp) polymer and copolymer blends, composites and other structures using techniques such as DSC and SEM,

Cluster 35 [29]

"**alloys**" (81) "**alloy**" (70) "**phase**" (32) "**temperature**" (31) "**ti**", "**microstructure**" (26) "**alpha**", "**oxidation**" (25) "**ni**" (22) "**al4sr**" (21) "**properties**", "**sr**", "**coating**" (20) "**tial**" (19) "**c**", "**high**", "**degreesc**", "**tensile**", "**gamma**" (18) "**x**", "**mg**" (17) "**process**", "**addition**", "**melt**" (15) "**science**", "**spun**", "**wt**", "**nb**", "**ageing**" (14) "**mechanical**", "**two**", "**cast**" (13) "**b**", "**v**", "**strength**", "**room**", "**resistance**", "**microstructures**", "**zn**" (12) "**c science**" (13) "**mechanical properties**" (11) "**b v**", "**science b**", "**melt spun**", "**room temperature**" (10) "**tial based**", "**based alloys**" (9) "**high temperature**", "**tensile properties**", "**sr alloy**" (8) "**cast ageing**", "**two phase**", "**23 sr**", "**ageing process**" (7) "**mah g**", "**tial alloys**", "**wt pct**", "**oxidation resistance**", "**nitrided alloys**", "**hall petch**", "**spun 23**", "**yield strength**", "**5ti 1b**" (6) "**c science b**", "**science b v**" (10) "**tial based alloys**" (9) "**23 sr alloy**", "**cast ageing process**", "**melt spun 23**" (6) "**2cr 2nb 25nd**", "**5ti 1b master**", "**46 5al 2cr**", "**1b master alloy**", "**spun 23 sr**", "**ti 46 5al**", "**5al 2cr**

2nb" (5) "**10cr 11al 8ti**", "**ni 10cr 11al**", "**ni 3cr 20al**", "**mah g x**", "**2nb 25nd alloy**", "**high temperature oxidation**" (4)

Focuses on the characterization of microstructure properties of alloy materials consisting of ti, ni, sr, nb, mg, al.

Cluster 36 [29]

"**strength**" (70) "**properties**" (55) "**mechanical**" (53) "**composites**" (46) "**temperature**" (38) "**content**" (28) "**high**" (27) "**tensile**" (26) "**fibers**" (21) "**composite**", "**damping**", "**modulus**" (20) "**c**" (17) "**increasing**", "**concrete**" (15) "**matrix**" (14) "**higher**", "**w**", "**woodceramics**" (13) "**bending**", "**flexural**" (12) "**increased**", "**increase**", "**surface**", "**size**", "**maa**", "**zk60a**" (11) "**magnesium**", "**fracture**", "**polyethylene**", "**gpa**", "**polysilicon**" (10) "**mechanical properties**" (41) "**tensile strength**" (19) "**flexural strength**" (11) "**bending strength**" (10) "**ssps k**" (9) "**c science**", "**wcms zk60a**", "**magnesium hydroxide**", "**surface roughness**" (7) "**high temperature**", "**mg maa**", "**elevated temperature**", "**jute fibers**", "**sbr vulcanizates**", "**polyethylene magnesium**" (6) "**solid loading**", "**temperature strength**", "**zrc w**", "**zk60a composite**", "**crosslinking agent**", "**mm length**", "**strength flexural**", "**strength concrete**", "**decreased increasing**", "**mole ratio**" (5) "**polyethylene magnesium hydroxide**" (6) "**wcms zk60a composite**", "**strength flexural strength**" (5) "**mg maa content**", "**high strength concrete**", "**young s modulus**", "**content ssps k**", "**maa mole ratio**", "**magnesium hydroxide composites**", "**mgo maa mole**", "**flexural strength toughness**" (4)

Focuses on the mechanical properties, such as strength, of polyethylene magnesium hydroxide composites, fibers, concrete, woodceramics, and polysilicon.

Cluster 37 [29]

"**group**" (149) "**p**" (129) "**rats**" (65) "**05**" (61) "**g**" (56) "**l**" (51) "**01**" (48) "**groups**", "**control**" (46) "**hsc**" (41) "**apoptosis**" (39) "**proliferation**" (38) "**cells**" (31) "**hours**" (30) "**higher**" (29) "**48**", "**cell**", "**maotai**" (27) "**h**" (26) "**24**", "**expression**", "**normal**", "**12**" (24) "**flow**" (23) "**rate**", "**mg**", "**methods**", "**treatment**" (22) "**ml**", "**hepatic**", "**rhgh**" (21) "**lower**", "**increased**", "**decreased**", "**lps**" (20) "**p 05**" (59) "**p 01**" (44) "**control group**" (28) "**group p**" (27) "**p 001**" (19) "**g l**" (17) "**flow cytometry**", "**maotai liquor**", "**rhgh gin**" (13) "**hsc proliferation**" (11) "**mumol l**" (10) "**mug ml**", "**normal group**", "**99 99**", "**higher control**" (9) "**smmc 7721**", "**ng g**", "**yigan decoction**", "**mg kg**", "**portal vein**", "**parts thousand**", "**blood flow**" (8) "**group p 05**" (13) "**control group p**", "**group p 01**" (10) "**99 99 99**" (8) "**maotai liquor group**" (7) "**24 48 72**", "**higher control group**", "**smmc 7721 cells**" (6) "**cell cycle distribution**", "**gin supplemented pn**", "**g l maotai**", "**ordinary white wine**", "**direct version intracardiac**", "**18 g l**" (5)

Focuses on the physiology of rat cells to determine the effects on blood flow from maotai liquor and white wine.

Cluster 38[29]

"**temperature**" (95) "**k**" (52) "**range**" (32) "**mol**" (31) "**pressure**" (26) "**c**", "**activation**", "**kj**" (21) "**thermal**", "**oxidation**", "**h2o**" (20) "**energy**", "**ala**" (18) "**reaction**" (17) "**high**", "**fe**" (15) "**degreesc**", "**conductivity**" (14) "**rate**", "**increases**", "**value**" (13) "**b**", "**injection**" (12) "**two**", "**method**", "**science**", "**phase**", "**solid**", "**clo4**" (11) "**o**", "**increasing**", "**measured**", "**j**" (10) "**properties**", "**e**", "**decomposition**", "**complex**", "**time**", "**iii**", "**synthesized**" (9) "**temperature range**" (28) "**kj mol**" (21) "**activation energy**", "**ala h2o**" (16) "**c science**", "**h2o clo4**" (11) "**b v**", "**science b**" (7) "**peak temperature**", "**increasing temperature**", "**electrical conductivity**", "**fe iii**", "**high temperature**" (6) "**temperature dependence**", "**ho2 ala**", "**j k**", "**ery ala**", "**k peak**", "**h2o cl**", "**injection pressure**", "**heat capacities**", "**high pressure**", "**k mol**" (5) "**ala h2o clo4**" (11) "**science b v**", "**c science b**" (7) "**ery ala h2o**", "**k peak temperature**", "**j k mol**", "**ala h2o cl**", "**ho2 ala h2o**" (5) "**activation energy e**", "**o sialon zro2**", "**calorimeter temperature range**" (4)

Focuses on characterizing physical properties of various compounds for different temperature ranges.

Cluster 39 [28]

"**thermal**" (33) "**temperature**" (31) "**glass**" (24) "**t**" (22) "**structure**" (21) "**c**" (20) "**stability**", "**transition**" (19) "**amorphous**" (17) "**x**", "**high**" (16) "**scanning**", "**dsc**" (15) "**g**", "**differential**" (14) "**properties**", "**higher**", "**calorimetry**", "**poly**" (13) "**s**", "**phase**", "**ray**" (11) "**science**", "**temperatures**", "**diffraction**", "**weight**", "**crystallization**" (10) "**based**", "**samples**", "**molecular**", "**co**", "**alloy**" (9) "**glass transition**" (18) "**thermal stability**" (17) "**differential scanning**" (14) "**transition temperature**", "**scanning calorimetry**" (13) "**x ray**", "**t g**" (11) "**c science**", "**ray diffraction**" (9) "**calorimetry dsc**" (7) "**temperature t**", "**weight loss**", "**crystalline structure**" (5) "**thermal properties**", "**t m**", "**second order**", "**ether ketone**", "**molecular weight**", "**gfa thermal**", "**temperatures t**", "**c periodicals**", "**km min**", "**ketone s**", "**supercooled liquid**" (4) "**differential scanning calorimetry**", "**glass transition temperature**" (13) "**x ray diffraction**" (9) "**scanning calorimetry dsc**" (7) "**gfa thermal stability**", "**ether ketone s**" (4) "**transition temperature t**", "**weight loss temperature**", "**fourier transform infrared**", "**angle x ray**", "**wide angle x**", "**supercooled liquid region**", "**t g t**", "**high glass transition**", "**temperature t g**" (3)

Focuses on characterizing the thermal properties and crystalline structures of glass and polymers using techniques such as xrd, dsc, and ftir.

Cluster 40 [28]

"**molecular**" (52) "**models**" (34) "**model**" (32) "**compounds**" (30) "**structure**" (27) "**binding**" (26) "**activity**", "**linear**" (22) "**three**" (20) "**based**", "**r**" (19) "**regression**", "**descriptors**" (18) "**indices**", "**comfa**" (17) "**properties**", "**qspr**", "**qsar**" (16) "**v**", "**new**", "**relationship**", "**multiple**", "**interactions**" (15) "**quantitative**", "**structures**" (14) "**correlation**" (13) "**c**", "**energies**", "**inhibitors**", "**comsia**" (12) "**s**", "**cross**", "**science**", "**chemical**", "**structural**", "**group**", "**set**", "**atomic**", "**log**", "**comparative**" (11) "**quantitative structure**" (14) "**linear regression**" (12) "**c science**", "**comparative molecular**" (11) "**multiple linear**" (10) "**3d qsar**", "**free energies**" (8) "**molecular descriptors**", "**log k**", "**binding free**", "**quantum chemical**" (7) "**physical properties**", "**qspr models**", "**cross validation**", "**structure property**", "**structure activity**", "**qsar models**", "**der waals**", "**van der**", "**field comfa**", "**molecular size**", "**molecular field**" (6) "**multiple linear regression**" (10) "**binding free energies**" (7) "**molecular field comfa**", "**comparative molecular field**", "**van der waals**" (6) "**linear regression mlr**", "**log k oa**", "**quantitative structure property**" (5) "**quantitative structure retention**", "**science b v**", "**root mean square**", "**three dimensional quantitative**", "**c science b**", "**dimensional quantitative structure**", "**comparative molecular similarity**" (4)

Focuses on modeling the properties and interactions of molecular compounds and structures.

Cluster 41 [28]

"**quantum**" (65) "**state**" (33) "**electron**" (28) "**field**" (22) "**magnetic**" (19) "**two**" (18) "**energy**" (17) "**phonon**" (16) "**dot**" (14) "**system**" (13) "**temperature**" (12) "**method**", "**states**" (10) "**b**", "**spin**", "**modes**", "**current**", "**numerical**", "**electric**" (9) "**interaction**", "**coupling**", "**time**", "**mass**", "**external**", "**calculation**", "**discrimination**", "**cds**" (8) "**spectra**", "**single**", "**theory**", "**strength**", "**dependent**", "**optical**", "**noise**", "**circuit**", "**dots**", "**io**" (7) "**quantum dot**" (12) "**magnetic field**" (10) "**electric field**" (8) "**cds hgs**", "**electron hole**", "**numerical calculation**", "**quantum dots**" (6) "**c science**", "**ground state**", "**f center**", "**phonon modes**", "**shot noise**", "**set discrimination**", "**electron phonon**" (5) "**science b**", "**state quantum**", "**density matrix**", "**excitation energy**", "**phonon interaction**", "**magnetic fields**", "**low lying**", "**valence bond**", "**current fluctuation**", "**optical phonon**", "**quantum chemistry**", "**io phonon**", "**b v**" (4) "**c science b**", "**optical phonon modes**", "**science b v**" (4) "**density matrix negativity**", "**two uncoupled oscillators**", "**quantum dot molecules**", "**dynamic current fluctuation**" (3)

Focuses on characterizing electron quantum physics properties of various elements.

Cluster 42 [27]

"**state**" (30) "**energy**", "**spin**" (29) "**b**" (28) "**c**" (27) "**coupling**", "**exchange**" (22) "**magnetic**", "**antiferromagnetic**" (19) "**field**", "**j**" (17) "**s**", "**states**", "**t**", "**model**" (14) "**science**", "**v**", "**interaction**", "**n**" (12) "**experimental**", "**structure**", "**covalent**" (11) "**system**", "**ground**" (10) "**method**", "**epsilon**", "**symmetry**" (9) "**theoretical**", "**mean**", "**density**", "**bias**", "**excited**" (8) "**two**", "**range**", "**iii**", "**cu**", "**angle**", "**calculations**", "**theta**", "**ferromagnetic**" (7) "**b v**", "**science b**", "**c science**" (12) "**ground state**" (10) "**mean field**" (7) "**exchange coupling**", "**exchange interaction**", "**symmetry state**", "**exchange bias**" (6) "**fe iii**", "**excited states**", "**cu ii**", "**broken symmetry**" (5) "**reversion energy**", "**magnetic field**", "**energy broken**", "**antiferromagnetic coupling**", "**epsilon epsilon**", "**magnetic exchange**", "**ii b**", "**iii cu**" (4) "**c science b**", "**science b v**" (12) "**reversion energy broken**", "**energy broken symmetry**", "**broken symmetry state**", "**iii cu ii**", "**fe iii cu**", "**cu ii b**" (4) "**cytochrome c oxidase**", "**coupling parameter j**", "**monte carlo hamiltonian**", "**high t c**", "**exchange coupling parameter**", "**rotation angle theta**", "**thermal radiation state**", "**t j model**", "**squeezed thermal radiation**", "**ground state excited**" (3)

Focuses on models of physical properties of nuclear particles such as energy states, spins, antiferromagnetic coupling, and magnetic fields.

Cluster 43 [27]

"**fe**" (47) "**c**", "**magnetic**" (39) "**b**" (30) "**properties**" (23) "**phase**" (22) "**high**", "**alpha**" (21) "**films**", "**h**" (20) "**grain**", "**size**" (19) "**s**", "**structure**" (18) "**x**", "**microstructure**" (17) "**m**" (16) "**coercivity**" (15) "**nanocomposite**" (14) "**samples**", "**temperature**" (13) "**phases**", "**n**", "**si**" (12) "**grains**", "**sample**", "**exchange**", "**alloy**" (11) "**v**", "**degreesc**", "**annealing**", "**gamma**", "**wc**", "**melted**" (10) "**magnetic properties**" (21) "**alpha fe**" (16) "**grain size**" (13) "**exchange coupling**" (9) "**c science**" (8) "**x ray**", "**b v**", "**science b**", "**hard magnetic**" (7) "**plasma arc**", "**fe n**" (6) "**zr doping**", "**nd9fe85 xb6mnx**", "**h c**", "**bh max**", "**m s**" (5) "**science b v**", "**c science b**" (7) "**exchange coupling interaction**", "**electric resistance furnace**", "**nd9fe85 xb6mnx nanocomposite**", "**x ray diffraction**", "**melted electric resistance**", "**fe n films**" (4) "**r m s**", "**plasma arc melting**", "**m r m**", "**structure magnetic properties**", "**alpha fe grains**", "**sm co si**", "**soft magnetic properties**", "**reduction grain size**" (3)

Focuses on characterizing the magnetic properties of iron (fe) films and nanocomposite microstructures.

Cluster 44 [27]

"**dna**" (170) "**binding**" (28) "**interaction**" (25) "**cleavage**" (17) "**fluorescence**", "**cu**" (15) "**c**", "**complex**" (14) "**calf**", "**ssdna**", "**dsdna**" (13) "**base**", "**double**", "**iii**", "**electrode**", "**intercalation**", "**thymus**" (12) "**method**", "**phen**" (11) "**system**", "**science**", "**potential**", "**tau**" (10) "**i**", "**based**", "**b**", "**three**", "**complexes**", "**reaction**", "**sensor**", "**gold**", "**blm**" (9) "**dna cleavage**" (13) "**calf thymus**" (12) "**thymus dna**" (11) "**c science**" (10) "**plant**

dna" (8) "**dna binding**" (7) "**gold electrode**", "**double helix**" (6) "**base pairs**", "**b v**", "**science b**", "**cu edta**", "**interaction dna**", "**ct dna**", "**cu en**" (5) "**cu phen**", "**ssdna dsdna**", "**helix dna**", "**dna sensor**", "**bind dna**", "**metal ions**", "**en cu**", "**ions dna**", "**cyclic voltammetry**", "**stranded dna**" (4) "**calf thymus dna**" (11) "**science b v**", "**c science b**" (5) "**cu en cu**", "**en cu edta**", "**metal ions dna**" (4) "**potential modulated dna**", "**cl h2o ch3ch2oh**", "**high liquid chromatography**", "**dna cleavage cu**", "**cl l bis**", "**noble metal ions**", "**modulated dna cleavage**", "**t t dimer**", "**double helix dna**", "**phen cl h2o**", "**liquid chromatography hplc**", "**three noble metal**" (3)

Focuses on using fluorescence methods to characterize dna binding abilities resulting from dna interactions with other compounds.

Cluster 45 [26]

"**method**" (51) "**temperature**" (44) "**field**" (28) "**numerical**" (27) "**heat**" (22) "**transfer**" (19) "**model**", "**data**" (18) "**inverse**" (17) "**time**" (15) "**based**", "**function**", "**paper**" (13) "**coupled**", "**fields**", "**radiative**" (12) "**surface**", "**boundary**", "**electric**" (11) "**scattering**", "**distribution**" (10) "**pressure**", "**c**", "**three**", "**internal**", "**solution**", "**seepage**", "**finite**", "**stresses**", "**averaged**", "**dam**" (9) "**heat transfer**" (10) "**time averaged**" (9) "**c science**" (8) "**inherent strain**", "**thin film**", "**radiative transfer**" (6) "**concrete dam**", "**temperature field**", "**good agreement**", "**finite element**", "**temperature fields**", "**averaged temperature**" (5) "**boundary intensity**", "**tidal currents**", "**electric field**", "**three dimensional**", "**field data**", "**internal tidal**", "**residual stresses**", "**piezoelectric thin**" (4) "**time averaged temperature**" (5) "**internal tidal currents**", "**piezoelectric thin film**" (4) "**surface heat transfer**", "**heat transfer coefficient**", "**inherent strain field**", "**temperature fields concrete**", "**initial geometric imperfections**", "**seepage temperature fields**", "**fields concrete dam**" (3)

Focuses on various methods and modeling of the effects of physical properties related to temperature.

Cluster 46 [26]

"**surface**" (86) "**area**" (42) "**adsorption**" (33) "**k**", "**tio2**" (25) "**al2o3**" (24) "**temperature**", "**sample**", "**pore**" (23) "**activity**", "**high**", "**g**" (21) "**specific**" (19) "**degreesc**", "**tin**" (17) "**co**", "**zirconia**" (16) "**increased**", "**x**", "**o**", "**spectroscopy**" (15) "**m**", "**electron**", "**samples**", "**content**", "**ray**", "**oxide**", "**catalyst**" (14) "**h**" (13) "**nitrogen**", "**alumina**" (12) "**energy**", "**calcination**", "**mesostructured**" (11) "**surface area**" (42) "**specific surface**" (19) "**x ray**" (14) "**m g**" (12) "**mesostructured tin**" (10) "**tio2 al2o3**" (8) "**pore size**", "**ray diffraction**", "**nitrogen adsorption**", "**rh 100**", "**tin oxide**", "**high surface**" (7) "**smox rh**", "**c science**" (6) "**surface areas**", "**mmol g**", "**pd al2o3**", "**adsorption desorption**", "**calcination temperature**" (5) "**specific surface area**" (17) "**x ray diffraction**", "**mesostructured tin oxide**" (7) "**high surface area**",

"**smox rh 100**" (6) "**activity pd al2o3**", "**rh 100 surface**", "**surface area alumina**", "**mnox tio2 al2o3**", "**x ray photoelectron**", "**high specific surface**" (4)

Focuses on studying the effects of surface area related to adsorption of such powder materials as tio2 and al2o3 using xrd and xps techniques.

Cluster 47 [26]

"**genes**" (106) "**expression**" (83) "**gene**" (41) "**expressed**", "**cdna**", "**regulated**" (26) "**hcc**" (21) "**cell**", "**cells**", "**tumor**" (20) "**human**", "**clones**" (19) "**two**" (18) "**metastasis**", "**pcr**" (17) "**protein**", "**tissue**" (16) "**blot**" (15) "**molecular**", "**sequence**", "**differential**" (14) "**carcinoma**", "**trkc**" (13) "**specific**", "**positive**", "**down**" (12) "**northern**", "**liver**", "**normal**", "**gastric**", "**rt**", "**array**", "**est**" (11) "**gene expression**" (29) "**rt pcr**", "**down regulated**" (11) "**northern blot**" (10) "**expression genes**", "**positive clones**" (9) "**hepatocellular carcinoma**", "**differentially expressed**" (8) "**expression profiles**", "**expression patterns**", "**polymerase chain**", "**adipose tissue**", "**chain reaction**" (7) "**cdna array**", "**differential expression**", "**reverse transcription**", "**visceral adipose**", "**molecular mechanism**", "**genes down**", "**regulated genes**" (6) "**polymerase chain reaction**" (7) "**visceral adipose tissue**" (6) "**genes down regulated**", "**reverse transcription polymerase**", "**transcription polymerase chain**", "**differential expression genes**", "**reaction rt pcr**", "**gene expression profiles**", "**chain reaction rt**", "**gene expression patterns**" (5) "**genes high expression**", "**subtractive hybridization ssh**", "**expression p77pmc rats**", "**suppression subtractive hybridization**", "**blot positive clones**", "**dot blot positive**", "**rats low expression**", "**hepatocellular carcinoma hcc**" (4)

Focuses on studying changes in gene expression of cells, proteins, and tissues due to hepatocellular carcinoma (HCC).

Cluster 48 [26]

"**solutions**", "**equation**" (42) "**wave**" (32) "**nonlinear**" (23) "**soliton**" (20) "**method**" (19) "**equations**", "**dimensional**" (18) "**solitary**" (15) "**functions**", "**new**" (13) "**solution**" (12) "**transformation**" (11) "**system**", "**special**" (10) "**b**", "**integrable**" (9) "**c**", "**model**", "**extended**", "**structures**", "**localized**", "**waves**" (8) "**science**", "**arbitrary**", "**periodic**", "**solitons**", "**gordon**" (7) "**wave solutions**", "**solitary wave**" (11) "**c science**" (7) "**soliton solution**", "**soliton solutions**", "**coherent structures**", "**arbitrary functions**", "**b v**", "**science b**", "**gordon equation**", "**backlund transformation**" (6) "**balance method**", "**higher order**", "**homogeneous balance**", "**nonlinear schrodinger**", "**localized coherent**" (5) "**broer kaup**", "**sine gordon**", "**nonlinear evolution**", "**nonlinear dispersion**", "**variable separation**", "**solitary waves**", "**extended homogeneous**", "**envelope solitary**", "**periodic solutions**" (4) "**solitary wave solutions**" (7) "**science b v**", "**c science b**" (6) "**localized coherent structures**", "**homogeneous balance method**"

(5) "**sine gordon equation**", "**extended homogeneous balance**" (4) "**dimensional broer kaup**", "**nonlinear evolution equation**" (3)

Focuses on the components of mathematics equations, solutions and techniques.

Cluster 49 [26]

"**surface**" (69) "**c**" (42) "**111**" (27) "**energy**", "**stm**" (22) "**molecules**" (19) "**science**", "**b**", "**v**" (18) "**cu**" (16) "**surfaces**" (14) "**tunneling**" (13) "**atoms**" (12) "**scanning**", "**co2**" (11) "**method**", "**h**", "**20**", "**bond**", "**ni**" (10) "**microscopy**", "**film**", "**molecular**", "**low**" (9) "**s**", "**interaction**", "**t**", "**atomic**", "**images**", "**ice**", "**pvoh**" (8) "**i**", "**based**", "**temperature**", "**experimental**", "**order**", "**metal**", "**co**", "**cluster**" (7) "**c science**" (17) "**b v**", "**science b**" (15) "**scanning tunneling**" (11) "**c 20**" (10) "**tunneling microscopy**", "**cu 111**" (9) "**111 surface**", "**stm images**" (7) "**microscopy stm**" (6) "**metal surfaces**" (5) "**ru 0001**", "**t c**", "**ni 111**", "**pvoh molecules**" (4) "**science b v**", "**c science b**" (15) "**scanning tunneling microscopy**" (9) "**tunneling microscopy stm**" (6) "**cu 111 surface**" (4) "**111 ru 0001**", "**surface solid target**", "**s o c**", "**111 cu 111**", "**h o ti**" (3)

Focuses on various studies using the technique of scanning tunneling microscopy (STM) to image surfaces.

Cluster 50 [25]

"**i**" (133) "**ca2**" (85) "**cells**" (53) "**l**" (35) "**current**" (27) "**concentration**", "**receptor**", "**mum**" (26) "**c**", "**induced**", "**potential**" (23) "**cell**" (22) "**myocytes**" (21) "**membrane**", "**increase**", "**k**", "**dependent**" (20) "**mumol**", "**na**" (19) "**rat**", "**neurons**", "**ht**" (18) "**inhibited**", "**mv**", "**gaba**" (17) "**protein**", "**channels**" (16) "**rate**", "**decreased**", "**action**" (15) "**increased**", "**dopamine**" (14) "**kinase**", "**intracellular**", "**clamp**", "**ks**" (13) "**ca2 i**" (36) "**mumol l**" (19) "**i na**" (14) "**i ks**", "**protein kinase**" (13) "**current i**" (12) "**i to1**", "**whole cell**", "**i kr**" (11) "**concentration dependent**", "**ventricular myocytes**", "**patch clamp**" (10) "**i oscillations**", "**kinase c**", "**sa i**", "**i ach**", "**action potential**" (9) "**membrane stretch**", "**c science**", "**dependent manner**", "**membrane potential**", "**hyposmotic membrane**" (8) "**ht neurons**", "**receptor agonist**", "**cytochalasin d**", "**hypertrophied cells**", "**cell patch**" (7) "**ca2 i oscillations**", "**protein kinase c**" (9) "**hyposmotic membrane stretch**" (8) "**whole cell patch**", "**cell patch clamp**" (7) "**concentration dependent manner**" (6) "**action potential duration**" (5) "**mumol l 95**", "**k current i**", "**activating component i**", "**membrane potential 60**", "**l 95 confidence**", "**concentration ca2 i**", "**patch clamp technique**", "**i i l**", "**frequency spontaneous epscs**", "**i kr i**", "**potassium current i**" (4)

Focuses on studying the concentration dependent physiology of cells and membranes from rats.

Cluster 51 [24]

"**magnetic**" (111) "**field**" (66) "**current**" (22) "**flux**" (16) "**intensity**", "**electric**" (13) "**surface**" (12) "**transmission**" (11) "**two**", "**structure**", "**optical**" (10) "**model**", "**solar**" (9) "**properties**", "**high**", "**paper**", "**fields**", "**radio**" (8) "**force**", "**region**", "**process**", "**active**", "**sand**", "**double**", "**strength**", "**photosphere**" (7) "**one**", "**increase**", "**map**", "**equations**", "**density**", "**axial**", "**separation**", "**negative**", "**wave**", "**barrier**", "**eolian**" (6) "**magnetic field**" (47) "**magnetic fields**" (8) "**magnetic flux**" (7) "**eolian sand**" (6) "**surface finish**", "**sand beds**" (5) "**electric field**", "**nickel electroforms**", "**x g**", "**radio map**", "**magnetic electric**", "**2d arrays**", "**field strength**", "**hybrid magnetic**", "**fms process**", "**bose einstein**", "**active regions**", "**transmission intensity**", "**delta function**", "**axial magnetic**", "**einstein condensations**", "**flux tube**" (4) "**eolian sand beds**" (5) "**axial magnetic field**", "**magnetic field strength**", "**hybrid magnetic electric**", "**bose einstein condensations**" (4) "**fe tpp cl**", "**northern southern hemisphere**", "**optical phase conjugated**", "**x g cm**" (3)

Focuses on the study of magnetic fields and their effects.

Cluster 52 [24]

"**c**" (25) "**science**" (24) "**reaction**", "**yields**" (7) "**synthesis**" (6) "**derived**", "**general**", "**solar**" (5) "**s**", "**high**", "**conditions**", "**systems**", "**new**", "**case**", "**amino**", "**catalyzed**", "**building**" (4) "**properties**", "**method**", "**china**", "**group**", "**series**", "**design**", "**good**", "**formula**", "**velocity**", "**ethyl**", "**asymmetric**", "**ligands**", "**enantioselective**", "**aryl**" (3) "**c science**" (22) "**good yields**" (3) "**null controllable**", "**hydroxy methyl**", "**solar control**", "**ethyl cyano**", "**new azo**", "**china c**", "**cospar science**", "**group velocity**", "**baylis hillman**", "**amino pyridone**", "**aryl halo**", "**halo dienes**", "**cyano hydroxy**", "**room temperature**", "**conditions c**", "**controllable regions**", "**motion curve**", "**methyl amino**", "**c cospar**", "**azo dyes**", "**dithianes dithiolanes**" (2) "**conditions c science**", "**null controllable regions**", "**hydroxy methyl amino**", "**methyl amino pyridone**", "**ethyl cyano hydroxy**", "**cyano hydroxy methyl**", "**new azo dyes**", "**aryl halo dienes**", "**c cospar science**" (2)

Focuses on the reactions and synthesis of organic compounds.

Cluster 53 [24]

"**method**" (45) "**based**" (26) "**new**" (20) "**feature**" (18) "**algorithm**", "**image**" (15) "**paper**" (14) "**domain**", "**noise**" (13) "**experimental**", "**information**" (12) "**features**", "**fractal**", "**wavelet**", "**segmentation**" (10) "**traditional**", "**extraction**" (9) "**c**", "**time**", "**methods**", "**transform**", "**images**", "**recognition**", "**fault**" (8) "**two**", "**encoding**", "**background**", "**accuracy**", "**alignment**", "**tumors**" (7) "**system**", "**parameters**", "**sequence**", "**contrast**", "**target**", "**vector**", "**spatial**", "**enhancement**", "**speech**", "**palmprint**" (6) "**feature extraction**" (8) "**wavelet transform**", "**gear fault**", "**c**

science" (5) "**spatial domain**", "**new method**", "**encoding time**", "**sublingual veins**", "**continuous wavelet**", "**fault diagnosis**" (4) "**acceleration signals**", "**neural network**", "**word spotting**", "**computation complexity**", "**paper new**", "**speech recognition**", "**gaze direction**", "**new algorithm**", "**pairwise alignment**", "**support vector**", "**frequency domain**", "**low contrast**", "**signal noise**", "**shaft centre**", "**maxima lines**" (3) "**continuous wavelet transform**" (4)

Focuses on signal processing algorithms for feature extraction in images and speech recognition using such techniques as fractals, wavelets, and neural networks.

Cluster 54 [24]

"**heat**" (91) "**transfer**" (50) "**system**" (26) "**cooling**" (23) "**water**" (20) "**recovery**" (19) "**temperature**", "**air**" (18) "**tube**" (17) "**mass**" (16) "**c**", "**science**", "**refrigeration**" (15) "**coefficient**" (14) "**thermal**" (13) "**flow**", "**experimental**" (12) "**energy**", "**conditions**", "**model**", "**heating**" (11) "**paper**", "**cycle**", "**working**", "**ruwct**" (10) "**rate**", "**two**", "**specific**", "**phase**", "**characteristics**" (9) "**method**", "**process**", "**flux**" (8) "**heat transfer**" (38) "**c science**" (15) "**transfer coefficient**", "**heat recovery**" (12) "**mass transfer**" (10) "**specific heat**" (8) "**heat flux**" (7) "**evaporative cooling**", "**convective heat**", "**roll worked**", "**boiling heat**" (6) "**narrow spaces**", "**water cooling**", "**worked tube**", "**refrigeration cycle**" (5) "**heat constant**", "**transfer coefficients**", "**refrigeration system**", "**cooling capacity**", "**cooling tower**", "**working conditions**", "**transfer characteristics**", "**heat mass**" (4) "**heat transfer coefficient**" (11) "**boiling heat transfer**", "**convective heat transfer**" (6) "**roll worked tube**" (5) "**water cooling tower**", "**specific heat constant**", "**heat mass transfer**" (4)

Focuses on heat transfer properties applied to refrigeration systems.

Cluster 55 [23]

"**soil**" (164) "**soils**" (36) "**n**" (30) "**water**" (27) "**k**" (26) "**c**" (25) "**model**" (22) "**two**", "**pb**" (21) "**rare**", "**plant**", "**log**" (20) "**p**", "**ha**" (16) "**g**", "**total**", "**organic**" (15) "**low**", "**concentrations**", "**red**", "**earths**" (14) "**concentration**", "**content**", "**moisture**", "**solute**" (13) "**increased**", "**decreased**", "**m**", "**species**" (12) "**s**", "**science**", "**china**", "**root**", "**earth**", "**kg**", "**cu2**", "**forest**", "**tailings**" (11) "**rare earths**" (13) "**log k**" (12) "**c science**" (11) "**k oc**" (9) "**mug g**", "**soil moisture**" (8) "**organic matter**", "**red soil**", "**rare earth**" (7) "**soil water**", "**k soil**", "**soil ph**", "**soil drying**" (6) "**rar soil**", "**req soil**", "**water characteristic**", "**soil column**", "**forest ecosystems**", "**griffith soil**", "**content dehydrogenase**", "**c n**", "**atp content**", "**pb zn**", "**e g**", "**soil organic**" (5) "**atp content dehydrogenase**" (5) "**dehydrogenase urease activities**", "**soil bulk density**", "**log k oc**", "**m s b**", "**science b v**", "**c science b**", "**content dehydrogenase urease**" (4)

Focuses on characterizing soil properties such as soil moisture and their effects.

Cluster 56 [23]

"**deformation**" (56) "**strain**" (50) "**grain**" (27) "**degreesc**", "**alloy**" (25) "**stress**", "**tial**" (24) "**rate**" (23) "**microstructure**" (21) "**s**" (20) "**temperature**" (19) "**dislocation**" (18) "**region**", "**process**", "**ferrite**" (16) "**low**", "**stage**" (15) "**high**", "**hot**", "**cyclic**" (14) "**loading**" (13) "**electron**", "**behavior**", "**ni**" (12) "**x**", "**intersection**" (11) "**rates**", "**slip**", "**dislocations**" (10) "**strain rate**" (18) "**degreesc strain**" (11) "**x s**" (10) "**strain rates**" (9) "**beta phase**", "**phase region**", "**c science**" (7) "**grain boundaries**", "**b v**", "**science b**", "**superplastic deformation**", "**hot deformation**", "**tial alloys**", "**transmission electron**", "**grain boundary**", "**css curve**", "**grain growth**", "**activation energy**" (6) "**nanocrystalline ferrite**", "**dislocation glide**", "**cyclic loading**", "**deformation behavior**", "**tial based**", "**high strain**", "**grain size**", "**based alloy**", "**controlled cyclic**", "**hot deformability**" (5) "**degreesc strain rate**" (8) "**beta phase region**" (7) "**science b v**" (6) "**tial based alloy**", "**c science b**", "**controlled cyclic loading**" (5) "**alpha beta phase**", "**grain boundary sliding**" (4)

Focuses on material properties such as deformation and strain on the grains of alloy microstructures.

Cluster 57 [21]

"**adsorption**" (114) "**bsa**" (23) "**diffusion**" (19) "**x**", "**equilibrium**" (17) "**model**" (15) "**protein**" (14) "**n**" (13) "**water**", "**ii**" (12) "**ph**", "**isotherms**", "**cb**" (11) "**c**", "**ion**", "**acid**", "**ionic**", "**strength**", "**capacity**" (10) "**ethylene**", "**bovine**", "**g**", "**pore**", "**pcb**", "**isotherm**" (9) "**two**", "**concentration**", "**science**", "**surface**", "**carbon**", "**gamma**", "**langmuir**", "**241**", "**hap**", "**humic**" (8) "**ionic strength**" (10) "**adsorption capacity**" (9) "**humic acid**", "**c science**" (8) "**bovine serum**" (7) "**b v**", "**science b**", "**serum albumin**", "**adsorption kinetics**", "**adsorption equilibrium**" (6) "**n ar**", "**adsorption capacities**", "**albumin bsa**", "**carbon dioxide**", "**pore diffusion**", "**gamma globulin**", "**phenolic compounds**", "**spectral correction**" (5) "**science b v**", "**c science b**", "**bovine serum albumin**" (6) "**serum albumin bsa**" (5) "**adsorption spectral correction**", "**phase ionic strength**" (4) "**spectral correction mpasc**", "**pore diffusion model**", "**clay humic acid**", "**four phenolic compounds**", "**liquid phase ionic**", "**correction mpasc technique**", "**oxygen carbon dioxide**", "**cb coupling density**", "**ionic strength cb**", "**microphase adsorption spectral**", "**poly ethylene oxide**" (3)

Focuses on the adsorption properties of organic compounds such as bovine serum albumin (BSA) proteins.

Cluster 58 [21]

"**ferroelectric**" (35) "**polarization**" (28) "**temperature**" (26) "**coupling**" (20) "**range**" (19) "**dielectric**", "**films**", "**pyroelectric**" (18) "**susceptibility**" (17) "**thin**",

"**interaction**", "**field**" (15) "**phase**", "**transition**" (14) "**long**" (13) "**coefficient**", "**stress**", "**model**" (12) "**structure**" (11) "**properties**", "**doped**", "**spontaneous**" (10) "**theory**", "**interfacial**", "**sbn**" (9) "**increase**", "**transverse**", "**magnetic**", "**interface**" (8) "**materials**", "**magnetoelectric**" (7) "**size**", "**find**", "**mean**", "**increases**", "**electric**", "**bilayer**", "**curie**" (6) "**long range**", "**thin films**" (13) "**pyroelectric coefficient**" (12) "**phase transition**" (11) "**interfacial coupling**" (9) "**spontaneous polarization**", "**range interaction**" (8) "**transition temperature**" (7) "**curie temperature**", "**dielectric susceptibility**" (6) "**mean field**" (5) "**susceptibility ferroelectric**", "**ferroelectric properties**", "**dielectric constant**", "**ising model**", "**transverse ising**", "**sandwich structure**", "**coefficient susceptibility**", "**coefficient dielectric**", "**field theory**", "**transverse field**", "**polarization susceptibility**" (4) "**long range interaction**" (8) "**phase transition temperature**" (6) "**pyroelectric coefficient susceptibility**", "**transverse ising model**", "**pyroelectric coefficient dielectric**", "**coefficient dielectric susceptibility**", "**mean field theory**" (4) "**ferroelectric interfacial coupling**", "**interfacial coupling transverse**", "**susceptibility ferroelectric bilayer**", "**long range coupling**", "**ferroelectric thin films**", "**average spontaneous polarization**", "**polarization curie temperature**" (3)

Focuses on ferroelectric, dielectric, and pyroelectric properties of thin films, to include their effects on polarization and coupling.

Cluster 59 [21]

"**second**" (36) "**optical**" (27) "**harmonic**" (23) "**generation**" (20) "**nonlinear**" (19) "**phase**" (18) "**structure**", "**order**" (16) "**frequency**" (15) "**c**" (14) "**method**", "**nm**", "**superlattice**" (9) "**parametric**", "**conversion**", "**quasi**", "**wave**", "**periodic**", "**shg**" (8) "**crystal**", "**efficiency**", "**metal**", "**processes**", "**matching**" (7) "**polymer**", "**based**", "**two**", "**three**", "**example**", "**third**", "**signal**", "**quasiperiodic**" (6) "**second harmonic**" (18) "**harmonic generation**" (16) "**second order**" (11) "**nonlinear optical**" (8) "**quasi phase**", "**phase matching**" (7) "**order nonlinear**" (5) "**optical parametric**", "**american physics**", "**frequency generation**", "**second harmonics**", "**pek c**", "**c american**", "**metal cluster**", "**phase matched**", "**sum frequency**", "**conversion efficiency**" (4) "**second harmonic generation**" (13) "**quasi phase matching**", "**c american physics**" (4) "**second order optical**", "**sum frequency generation**", "**c science b**", "**third harmonic generation**", "**quasi phase matched**", "**second order nonlinear**", "**nonlinear second order**", "**science b v**", "**harmonic generation shg**" (3)

Focuses on sciences with second and third order processes such as harmonics, wave generation, phases, and order primarily associated with the physics of non-linear optics, and crystal structures.

Cluster 60 [21]

"**gene**" (58) "**patients**" (42) "**p**" (33) "**genotype**" (28) "**controls**" (26) "**mrna**" (25) "**polymorphism**" (24) "**higher**" (22) "**pcr**" (21) "**allele**" (20) "**group**" (19) "**levels**" (17) "**c**", "**frequencies**", "**reaction**", "**chain**", "**polymerase**", "**vegf**" (16) "**cells**", "**genotypes**" (15) "**expression**" (14) "**i**", "**control**", "**igf**" (13) "**cases**", "**risk**" (12) "**s**", "**frequency**", "**chinese**", "**ad**", "**blood**", "**pd**", "**95**", "**methylation**", "**hanf**" (11) "**factor**", "**disease**", "**alcohol**", "**detected**" (10) "**polymerase chain**", "**chain reaction**" (16) "**p 05**" (9) "**ink4b gene**", "**tgf beta1**", "**p15 ink4b**" (8) "**trabecular meshwork**", "**rt pcr**" (7) "**gene polymorphism**", "**meshwork cells**", "**p 01**", "**patients controls**" (6) "**sle patients**", "**mrna levels**", "**gene transfer**", "**95 ci**", "**vegf mrna**", "**c science**", "**alcohol dependent**", "**c 509t**", "**growth factor**", "**odds ratio**" (5) "**polymerase chain reaction**" (16) "**p15 ink4b gene**" (8) "**trabecular meshwork cells**" (6) "**reaction rt pcr**", "**c 509t t869c**", "**chain reaction rt**", "**reverse transcriptase polymerase**", "**transcriptase polymerase chain**", "**tgf beta1 gene**" (4)

Focuses on the effects of the polymorphism of genes on different human diseases.

Cluster 61 [21]

"**beam**" (48) "**gaussian**" (27) "**beams**" (25) "**propagation**" (20) "**optical**" (15) "**phase**", "**derived**" (13) "**intensity**", "**shift**" (12) "**order**", "**formula**", "**laser**", "**paraxial**" (10) "**c**", "**elliptical**" (9) "**spatial**" (8) "**system**", "**method**", "**science**", "**factor**", "**focal**", "**flattened**" (7) "**m**", "**non**", "**new**", "**solution**", "**pulsed**", "**shifts**" (6) "**gaussian beam**", "**gaussian beams**" (12) "**c science**" (7) "**beam propagation**", "**focal shift**", "**elliptical gaussian**" (6) "**flattened gaussian**" (5) "**system derived**", "**relative focal**", "**m factor**", "**b v**", "**science b**", "**optical systems**", "**laser beam**", "**axis intensity**", "**pulsed beam**", "**nonlinear phase**", "**beam solution**", "**hermite gaussian**", "**paraxial optical**" (4) "**elliptical gaussian beam**" (5) "**c science b**", "**science b v**" (4) "**propagation factor m**", "**flattened gaussian beams**", "**gaussian beam misaligned**", "**annular focusing system**", "**relative focal shift**", "**hermite gaussian beams**", "**beam propagation factor**", "**factor m factor**" (3)

Focuses on gaussian beam propagation properties in applications with lasers and optics.

Cluster 62 [20]

"**ceramics**" (38) "**properties**" (31) "**materials**" (25) "**mechanical**" (24) "**toughness**" (23) "**fracture**" (22) "**strength**", "**bn**" (19) "**ceramic**" (18) "**phase**" (17) "**composite**", "**al2o3**", "**crack**" (15) "**sic**" (14) "**m**" (13) "**laminated**" (12) "**composites**", "**microstructure**", "**sintering**", "**zirconia**" (11) "**interface**", "**hot**" (10) "**high**", "**glass**", "**ha**", "**mpa**" (9) "**based**", "**samples**", "**containing**", "**si3n4**", "**bending**", "**toughening**" (8) "**mechanical properties**" (20) "**fracture toughness**" (13) "**si3n4 bn**", "**bending strength**", "**hot pressing**" (6) "**20 vol**", "**mpa m**", "**microwave sintering**", "**metallic inclusions**", "**crack deflection**" (5) "**work fracture**", "**strength fracture**", "**glass ceramics**", "**ti composite**", "**phase ceramics**", "**b o**", "**multi phase**" (4) "**strength**

fracture toughness", "**multi phase ceramics**" (4) "**y alpha sialon**", "**laminated si3n4 bn**", "**20 vol ti**", "**ha 20 vol**", "**b o n**", "**si3n4 bn ceramics**", "**bn interface layers**", "**samples microwave sintering**", "**vol ti composite**", "**si b o**" (3)

Focuses on the material properties (such as mechanical, toughness, and strength) of ceramics, glass and composites.

Cluster 63 [20]

"**laser**" (50) "**electron**" (23) "**cm**" (17) "**intensity**", "**x**" (15) "**high**", "**energy**", "**plasma**", "**w**" (14) "**electrons**" (13) "**density**" (12) "**beam**" (11) "**temperature**", "**ions**", "**plasmas**" (10) "**pulse**" (9) "**system**", "**target**", "**simulation**", "**kev**", "**fel**" (8) "**c**", "**physics**", "**ray**", "**generation**", "**hot**", "**atomic**" (7) "**two**", "**molecular**", "**measured**", "**length**", "**interaction**", "**free**", "**channel**", "**vacuum**", "**krf**", "**pulses**", "**acceleration**", "**code**" (6) "**w cm**" (14) "**x ray**" (7) "**laser pulse**", "**laser intensity**", "**plasma channel**", "**laser pulses**" (5) "**ultrashort laser**", "**perfect synchronism**", "**hard x**", "**femtosecond laser**", "**laser plasma**", "**laser system**", "**17 w**", "**b v**", "**science b**", "**c science**", "**hot electron**" (4) "**science b v**", "**17 w cm**", "**c science b**" (4) "**pulsed laser deposition**", "**14 w cm**", "**molecular beam epitaxy**", "**hard x ray**", "**charged fragmental ions**", "**c american physics**", "**singly charged fragmental**" (3)

Focuses on lasers used to study plasma and nuclear physics properties.

Cluster 64 [20]

"**black**" (43) "**entropy**" (36) "**hole**" (31) "**horizon**" (25) "**model**" (20) "**wall**", "**brick**" (18) "**s**" (17) "**spin**" (15) "**field**", "**q**" (13) "**method**", "**holes**" (12) "**energy**", "**event**", "**quantum**", "**scalar**", "**kerr**", "**newman**" (11) "**particles**", "**ext**" (10) "**temperature**", "**term**", "**area**", "**hawking**" (9) "**new**", "**proportional**", "**fields**" (8) "**membrane**", "**radiation**", "**thermal**" (7) "**time**" (6) "**black hole**" (29) "**brick wall**" (18) "**black holes**" (12) "**wall model**", "**kerr newman**", "**event horizon**" (11) "**ext q**" (10) "**s ext**" (9) "**membrane model**", "**wall method**" (7) "**q s**" (6) "**thermal radiation**", "**proportional area**" (5) "**dirac particles**", "**temperature event**", "**newman ads**", "**entropy black**", "**scalar field**", "**spin fields**", "**extensive energy**", "**spherically symmetric**", "**coordinate transformation**", "**b v**", "**science b**", "**c science**", "**entropy scalar**", "**tortoise coordinate**", "**method membrane**", "**newman ds**" (4) "**brick wall model**" (11) "**s ext q**" (9) "**brick wall method**" (7) "**q s ext**", "**ext q s**" (5) "**tortoise coordinate transformation**", "**temperature event horizon**", "**kerr newman ds**", "**method membrane model**", "**science b v**", "**c science b**", "**kerr newman ads**", "**entropy scalar field**", "**wall method membrane**" (4)

Focuses on characterizing black hole properties using techniques such as the brick wall method.

Cluster 65 [20]

"**cross**" (29) "**isospin**" (25) "**energy**" (24) "**n**" (22) "**nuclear**" (20) "**section**" (18) "**potential**", "**model**" (16) "**dependence**" (15) "**parameters**", "**reaction**" (14) "**experimental**", "**sections**" (12) "**two**", "**nucleon**" (11) "**body**", "**u**", "**mev**" (10) "**c**", "**18**", "**momentum**" (9) "**x**", "**state**", "**medium**", "**heavy**", "**projectile**" (8) "**ion**", "**quantum**", "**proton**", "**intermediate**", "**mean**", "**17**", "**dependent**", "**12**", "**nuclei**", "**symmetry**", "**collisions**", "**ne**" (7) "**cross section**" (18) "**cross sections**" (11) "**isospin dependence**" (8) "**symmetry potential**" (7) "**isospin dependent**", "**quantum molecular**", "**mev u**", "**two body**", "**heavy ion**", "**momentum dependence**", "**molecular dynamics**" (6) "**f 17**", "**intermediate energy**", "**ion collisions**", "**equation state**", "**17 ne**", "**differential cross**", "**mean field**" (5) "**nucleon nucleon**", "**nuclear reaction**", "**dependence interaction**", "**nuclear stopping**", "**optical potential**", "**n n**", "**high energy**", "**experimental data**" (4) "**quantum molecular dynamics**" (6) "**heavy ion collisions**", "**f 17 ne**" (5) "**differential cross section**", "**momentum dependence interaction**" (4) "**optical potential parameters**", "**intermediate energy heavy**", "**nucleon cross section**", "**nucleon nucleon cross**", "**dependent quantum molecular**", "**molecular dynamics iqmd**", "**17 ne 18**", "**nn cross section**", "**medium nucleon nucleon**", "**isospin dependent quantum**", "**molecular dynamics model**", "**isospin dependent medium**" (3)

Focuses on characterizing properties of nuclear and elementary particles such as cross-sectional energies, isospin fractination, and energy states.

Cluster 66 [20]

"**plasma**" (46) "**current**" (35) "**tokamak**" (22) "**density**" (21) "**field**", "**power**" (18) "**v**" (17) "**ht**" (16) "**system**" (15) "**temperature**", "**magnetic**", "**higher**" (12) "**design**", "**hl**", "**pf**" (11) "**superconducting**" (10) "**electron**", "**experiments**", "**beam**", "**ions**", "**ion**", "**confinement**", "**wave**", "**7u**" (9) "**pressure**", "**b**", "**emission**", "**progress**", "**control**", "**pellet**", "**g**", "**hybrid**", "**discharge**", "**pulse**", "**plasmas**", "**coils**", "**poloidal**", "**fueling**", "**lhcd**" (8) "**ht 7u**", "**plasma density**" (9) "**v g**" (8) "**current drive**", "**poloidal field**", "**optical emission**", "**hl 2a**" (7) "**lower hybrid**", "**plasma current**", "**heavy ions**", "**magnetic field**" (6) "**steady state**", "**pf coils**", "**rf power**", "**control system**" (5) "**field pf**", "**superconducting tokamak**", "**v v**", "**fwg antenna**", "**g equal**", "**toroidal field**", "**50 v**", "**electron temperature**", "**current density**", "**hl 1m**", "**beam injection**", "**implantation current**", "**current profile**" (4) "**implantation current density**", "**v v g**", "**v g equal**" (4) "**steady state operation**", "**poloidal field pf**", "**current drive lhcd**", "**radio frequency rf**", "**ht 7u superconducting**", "**optical emission strength**" (3)

Focuses on the principles of Plasma Physics in various applications, such as the tokamak reactor and superconducting.

Cluster 67 [20]

"**conditions**", "**yields**" (14) "**good**", "**mild**" (11) "**corresponding**", "**oxidation**" (8) "**alcohols**", "**aryl**" (7) "**ketones**" (6) "**c**", "**science**", "**high**", "**alpha**", "**compounds**", "**secondary**", "**bromide**", "**aldehydes**", "**azo**" (5) "**first**", "**paper**", "**substituted**", "**diaryl**", "**nano2**" (4) "**n**", "**simple**", "**water**", "**new**", "**time**", "**primary**", "**efficient**", "**free**", "**eight**", "**beta**", "**agent**", "**solvent**", "**neutral**", "**unsaturated**", "**acyl**", "**amides**", "**diallylated**" (3) "**good yields**" (9) "**mild conditions**" (8) "**c science**", "**azo compounds**" (5) "**secondary alcohols**", "**yields mild**" (4) "**solvent free**", "**free conditions**", "**aryl substituted**", "**unsaturated acyl**", "**alpha beta**", "**high yields**", "**aldehydes ketones**", "**beta unsaturated**", "**compounds nano2**", "**conditions good**", "**first time**", "**neutral conditions**" (3) "**good yields mild**", "**conditions good yields**", "**solvent free conditions**", "**azo compounds nano2**", "**beta unsaturated acyl**", "**alpha beta unsaturated**" (3)

Focuses on reaction properties and conditions of alcohols such as ketones, bromides, and aldehydes for improving yields.

Cluster 68 [20]

"**crack**" (86) "**stress**" (31) "**field**" (30) "**tip**" (25) "**material**", "**infinity**" (21) "**fracture**" (20) "**growth**" (19) "**fatigue**" (17) "**interface**" (16) "**intensity**", "**strain**", "**electric**" (14) "**paper**", "**displacement**" (11) "**piezoelectric**" (10) "**mechanical**", "**dynamic**", "**model**" (9) "**c**", "**energy**", "**conditions**", "**boundary**", "**y**" (8) "**rate**", "**two**", "**science**", "**factor**", "**zone**", "**theory**", "**factors**", "**plane**", "**sigma**", "**integral**", "**toughness**" (7) "**crack tip**" (23) "**crack growth**" (14) "**stress intensity**" (13) "**fatigue crack**" (11) "**y infinity**" (8) "**intensity factors**", "**tip field**", "**intensity factor**", "**c science**" (7) "**electric field**", "**electric displacement**" (6) "**strain energy**", "**fracture toughness**", "**interface crack**" (5) "**energy density**", "**infinity epsilon**", "**dynamic stress**", "**boundary conditions**", "**integral equation**", "**stress electric**" (4) "**stress intensity factor**" (7) "**crack tip field**", "**stress intensity factors**" (6) "**fatigue crack growth**" (5) "**dynamic stress intensity**" (4) "**stress electric displacement**", "**zone crack tip**", "**elastic piezoelectric dielectric**", "**strain energy density**" (3)

Focuses on the physical properties of materials (e.g. piezoelectric) that characterize strength such as crack growth, stress, strain, and fatigue.

Appendix 10A – Partitional Clustering Results
-CLUTO
-Science Citation Index
-40 Clusters

The format for each of the forty clusters is as follows. The cluster number is presented first, followed by cluster size and cohesiveness metrics (in parentheses), followed by weighted phrases. The Descriptive weightings represent the contribution of each phrase to the cluster's theme, and the Discriminating weightings represent the contribution of each phrase to the cluster's uniqueness from other clusters. At the end of each cluster is a brief summary of the main theme. Table A10A-1 below shows a summary of all the clusters analyzed.

Cluster 0 (Size: 154, ISim: 0.073, ESim: 0.005)

Descriptive: angstrom 23.9%, crystal 4.8%, degre 4.4%, space.group 3.1%, titl 2.8%, compound 2.8%, atom 2.7%, titl.compound 2.1%, group 1.8%, beta 1.8%, space 1.7%, monoclin 1.4%, structur 1.2%, complex 1.1%, bond 0.9%, crystal.structur 0.9%, h2o 0.9%, molecul 0.8%, rai 0.8%, coordin 0.7%, angstrom.beta 0.7%, ring 0.7%, ligand 0.6%, diffract 0.6%, hydrogen.bond 0.6%, 000 0.6%, unit 0.6%, two 0.5%, rai.diffract 0.5%, system.space 0.5%

Discriminating: angstrom 15.8%, degre 2.3%, space.group 2.0%, titl 1.8%, crystal 1.6%, titl.compound 1.4%, compound 1.0%, atom 1.0%, monoclin 0.9%, model 0.7%, film 0.7%, space 0.7%, temperatur 0.6%, method 0.5%, crystal.structur 0.5%, increas 0.5%, beta 0.5%, angstrom.beta 0.5%, phase 0.4%, activ 0.4%, high 0.4%, surfac 0.4%, h2o 0.4%, field 0.4%, time 0.4%, process 0.3%, measur 0.3%, paper 0.3%, group 0.3%, base 0.3%

Focuses on the physical characterization of crystal structures and compounds.

Cluster 1 (Size: 80, ISim: 0.056, ESim: 0.004)

Descriptive: rock 6.0%, metamorph 4.0%, ag 3.1%, zircon 2.1%, china 2.1%, north 1.9%, zone 1.7%, earli 1.4%, basin 1.4%, late 1.4%, eclogit 1.4%, south 1.3%, mantl 1.1%, granit 1.1%, volcan 1.0%, tecton 1.0%, fault 0.9%, belt 0.8%, dabi 0.8%, block 0.8%, miner 0.8%, deposit 0.7%, uhp 0.7%, orogen 0.7%, faci 0.6%, continent 0.6%, fauna 0.6%, upper 0.6%, dyke 0.6%, middl 0.6%

Discriminating: rock 3.7%, metamorph 2.5%, ag 1.4%, zircon 1.3%, north 1.2%, china 0.9%, eclogit 0.9%, zone 0.8%, basin 0.8%, late 0.8%, earli 0.7%, south 0.7%, mantl 0.7%, granit 0.7%, method 0.7%, volcan 0.7%, tecton 0.6%, film 0.6%, model 0.6%, cell 0.6%, temperatur 0.5%, fault 0.5%, dabi 0.5%, belt 0.5%, system 0.4%, orogen 0.4%, phase 0.4%, uhp 0.4%, faci 0.4%, miner 0.4%

Focuses on geological changes to different regions of China.

Cluster 2 (Size: 104, ISim: 0.056, ESim: 0.007)

<u>Descriptive</u>*: magnet 41.5%, field 3.9%, temperatur 2.4%, magnet.field 2.0%, magnet.properti 1.7%, transit 1.7%, spin 1.5%, ferromagnet 1.4%, magnetoresist 0.9%, properti 0.8%, phase 0.7%, superconduct 0.7%, coupl 0.6%, antiferromagnet 0.6%, coerciv 0.5%, curi 0.5%, increas 0.5%, electr 0.5%, microspher 0.5%, compound 0.5%, structur 0.4%, curi.temperatur 0.4%, electron 0.4%, electr.field 0.4%, sampl 0.4%, insul 0.3%, dope 0.3%, depend 0.3%, decreas 0.3%, state 0.2%*

<u>Discriminating</u>*: magnet 29.1%, field 1.3%, magnet.field 1.3%, magnet.properti 1.3%, ferromagnet 1.0%, spin 0.8%, magnetoresist 0.7%, film 0.6%, system 0.6%, transit 0.6%, method 0.5%, cell 0.5%, activ 0.5%, model 0.5%, solut 0.4%, reaction 0.4%, superconduct 0.4%, antiferromagnet 0.4%, complex 0.4%, coerciv 0.4%, group 0.4%, control 0.4%, curi 0.3%, new 0.3%, base 0.3%, acid 0.3%, microspher 0.3%, condit 0.3%, time 0.3%, two 0.3%*

Focuses on the electromagnetic properties of superconductors.

Cluster 3 (Size: 181, ISim: 0.052, ESim: 0.006)

<u>Descriptive</u>*: catalyst 43.7%, catalyt 4.7%, activ 4.2%, oxid 1.8%, reaction 1.8%, select 1.4%, catalyt.activ 1.3%, al2o3 1.1%, polymer 1.0%, hydrogen 0.9%, support 0.8%, convers 0.8%, sio2 0.5%, temperatur 0.4%, carbon 0.4%, sulfur 0.4%, ethylen 0.4%, acid 0.4%, gamma.al2o3 0.4%, complex 0.4%, surfac 0.4%, reduct 0.4%, yield 0.3%, high 0.3%, zeolit 0.3%, oxygen 0.3%, tpr 0.3%, promot 0.3%, speci 0.3%, ratio 0.2%*

<u>Discriminating</u>*: catalyst 30.9%, catalyt 3.1%, activ 1.3%, catalyt.activ 0.9%, film 0.7%, model 0.7%, select 0.6%, cell 0.6%, oxid 0.6%, al2o3 0.6%, system 0.5%, method 0.5%, polymer 0.4%, field 0.4%, two 0.4%, convers 0.4%, support 0.3%, energi 0.3%, structur 0.3%, crystal 0.3%, control 0.3%, paper 0.3%, patient 0.3%, function 0.3%, gamma.al2o3 0.3%, reaction 0.3%, measur 0.3%, group 0.3%, hydrogen 0.3%, solut 0.3%*

Focuses on the physical chemistry properties of catalyst and reactions of materials such as polymers, al2o3, hydrogen, sio2, ethylene, oxygen, and zeolite.

Cluster 4 (Size: 76, ISim: 0.053, ESim: 0.006)

<u>Descriptive</u>*: implant 14.3%, ion 12.1%, ion.implant 4.8%, diamond 3.5%, anneal 3.2%, irradi 1.7%, gan 1.7%, film 1.6%, dose 1.5%, layer 1.5%, waveguid 1.2%, deposit 1.0%, substrat 0.9%, surfac 0.9%, fluenc 0.8%, nucleat 0.7%, inp 0.5%, sampl 0.5%, laser 0.5%, profil 0.5%, temperatur 0.5%, electron 0.4%, energi 0.4%, diffus 0.4%, epitaxi 0.4%, electron.energi 0.4%, energi.loss 0.3%, electron.energi.loss 0.3%, diamond.film 0.3%, ion.dose 0.3%*

<u>Discriminating</u>: implant 10.5%, ion 7.0%, ion.implant 3.7%, diamond 2.5%, anneal 1.8%, gan 1.2%, irradi 1.0%, dose 0.9%, system 0.8%, waveguid 0.8%, method 0.6%, cell 0.6%, fluenc 0.6%, model 0.6%, two 0.5%, activ 0.5%, solut 0.4%, layer 0.4%, inp 0.4%, nucleat 0.4%, field 0.4%, complex 0.4%, structur 0.3%, acid 0.3%, new 0.3%, reaction 0.3%, substrat 0.3%, phase 0.3%, express 0.3%, paper 0.3%

Focuses on the methods of ion implantation on substrates and films and characterizing their physical properties.

Cluster 5 (Size: 210, ISim: 0.044, ESim: 0.004)

<u>Descriptive</u>: patient 49.3%, group 2.1%, arteri 1.5%, diseas 1.2%, month 1.0%, treatment 1.0%, case 0.7%, lesion 0.7%, tumor 0.7%, diagnosi 0.6%, surgeri 0.5%, score 0.4%, year 0.4%, symptom 0.4%, cancer 0.4%, surviv 0.4%, dai 0.3%, mean 0.3%, acut 0.3%, ag 0.3%, breast 0.3%, therapi 0.3%, method 0.3%, ey 0.3%, rate 0.3%, chines 0.3%, outcom 0.3%, recurr 0.3%, test 0.2%, on 0.2%

<u>Discriminating</u>: patient 32.0%, arteri 1.0%, temperatur 0.8%, model 0.7%, film 0.7%, diseas 0.7%, structur 0.7%, month 0.6%, system 0.5%, group 0.4%, crystal 0.4%, lesion 0.4%, surfac 0.4%, solut 0.4%, phase 0.4%, field 0.4%, surgeri 0.3%, reaction 0.3%, properti 0.3%, cell 0.3%, paper 0.3%, process 0.3%, complex 0.3%, energi 0.3%, state 0.3%, diagnosi 0.3%, electron 0.3%, high 0.3%, treatment 0.3%, increas 0.3%

Focuses on the symptoms, diagnosis, and success of treatments in Chinese patients with diseases and cancer, primarily associated with the breast, eyes, and arteries.

Cluster 6 (Size: 198, ISim: 0.045, ESim: 0.006)

<u>Descriptive</u>: ceram 14.7%, dielectr 13.8%, ferroelectr 5.7%, sinter 4.3%, phase 3.0%, temperatur 2.8%, dielectr.constant 1.7%, piezoelectr 1.5%, dielectr.properti 1.3%, properti 1.2%, constant 1.0%, phase.transit 1.0%, domain 1.0%, electr 0.9%, materi 0.8%, relaxor 0.8%, transit 0.8%, composit 0.7%, pmn 0.6%, polar 0.6%, pbtio3 0.5%, dope 0.5%, structur 0.5%, pyrochlor 0.5%, field 0.5%, 3nb2 0.4%, tetragon 0.4%, batio3 0.4%, increas 0.4%, sinter.temperatur 0.4%

<u>Discriminating</u>: ceram 10.6%, dielectr 10.1%, ferroelectr 4.0%, sinter 2.9%, dielectr.constant 1.3%, dielectr.properti 1.0%, piezoelectr 0.9%, phase 0.7%, relaxor 0.6%, phase.transit 0.6%, film 0.6%, cell 0.6%, model 0.6%, method 0.5%, pmn 0.5%, system 0.4%, reaction 0.4%, temperatur 0.4%, group 0.4%, activ 0.4%, pyrochlor 0.4%, pbtio3 0.4%, solut 0.4%, domain 0.4%, two 0.3%, constant 0.3%, 3nb2 0.3%, surfac 0.3%, scienc 0.3%, acid 0.3%

Focuses on the physical properties of ceramic materials.

Cluster 7 (Size: 362, ISim: 0.045, ESim: 0.006)

<u>*Descriptive*</u>*: film 47.5%, thin.film 4.8%, thin 4.6%, deposit 2.6%, substrat 2.1%, anneal 0.9%, pzt 0.8%, surfac 0.7%, thick 0.7%, layer 0.6%, sputter 0.6%, temperatur 0.5%, structur 0.4%, properti 0.4%, rai 0.4%, composit 0.4%, ferroelectr 0.3%, increas 0.3%, grain 0.3%, orient 0.3%, film.deposit 0.3%, polar 0.3%, electron 0.2%, sol 0.2%, dope 0.2%, stress 0.2%, tio2 0.2%, coat 0.2%, spectroscopi 0.2%, microscopi 0.2%*

<u>*Discriminating*</u>*: film 35.6%, thin.film 3.7%, thin 3.3%, deposit 1.5%, substrat 1.3%, system 0.7%, model 0.7%, pzt 0.6%, cell 0.5%, method 0.5%, activ 0.5%, anneal 0.5%, two 0.5%, complex 0.4%, sputter 0.4%, reaction 0.4%, group 0.4%, patient 0.3%, express 0.3%, acid 0.3%, thick 0.3%, function 0.3%, paper 0.3%, new 0.3%, base 0.3%, gene 0.3%, control 0.3%, time 0.3%, product 0.3%, equat 0.2%*

Focuses on the physical properties of thin films and substrates.

Cluster 8 (Size: 155, ISim: 0.043, ESim: 0.006)

<u>*Descriptive*</u>*: algorithm 47.5%, schedul 1.5%, method 1.0%, optim 0.9%, comput 0.8%, model 0.8%, paper 0.8%, converg 0.7%, genet.algorithm 0.7%, simul 0.6%, base 0.6%, machin 0.6%, object 0.5%, genet 0.5%, job 0.5%, new 0.5%, line 0.4%, fuzzi 0.4%, minim 0.4%, iter 0.4%, code 0.4%, network 0.4%, search 0.3%, system 0.3%, solv 0.3%, approxim 0.3%, complex 0.3%, program 0.3%, time 0.3%, effici 0.3%*

<u>*Discriminating*</u>*: algorithm 35.6%, schedul 1.1%, temperatur 0.8%, film 0.8%, cell 0.6%, crystal 0.5%, genet.algorithm 0.5%, increas 0.5%, activ 0.5%, structur 0.5%, phase 0.5%, reaction 0.4%, group 0.4%, job 0.4%, converg 0.4%, high 0.4%, field 0.4%, electron 0.4%, acid 0.3%, surfac 0.3%, machin 0.3%, patient 0.3%, energi 0.3%, comput 0.3%, composit 0.3%, ion 0.3%, mechan 0.3%, state 0.3%, magnet 0.2%, genet 0.2%*

Focuses on the efficiencies of genetic modeling, simulations and algorithms using techniques such as fuzzy logic.

Cluster 9 (Size: 199, ISim: 0.042, ESim: 0.005)

<u>*Descriptive*</u>*: gene 31.5%, dna 5.3%, express 5.2%, pcr 2.0%, genom 1.8%, sequenc 1.7%, plant 1.4%, transgen 1.4%, chromosom 1.2%, mutat 1.1%, clone 1.1%, tumor 0.9%, gene.express 0.8%, transcript 0.8%, genet 0.7%, cell 0.7%, rice 0.7%, protein 0.6%, promot 0.5%, detect 0.5%, region 0.4%, allel 0.4%, regul 0.4%, human 0.4%, tissu 0.4%, line 0.4%, cdna 0.4%, intron 0.4%, polymorph 0.3%, viru 0.3%*

<u>*Discriminating*</u>*: gene 21.6%, dna 3.0%, express 2.4%, pcr 1.3%, genom 1.2%, transgen 1.0%, chromosom 0.8%, film 0.7%, mutat 0.7%, temperatur 0.7%, sequenc 0.7%, model 0.7%, clone 0.7%, plant 0.6%, structur 0.6%, gene.express 0.6%, phase 0.5%, system 0.5%, crystal 0.5%, transcript 0.5%, surfac 0.5%, solut 0.5%, genet 0.4%, rice 0.4%, measur 0.4%, state 0.4%, field 0.4%, tumor 0.4%, method 0.4%, paper 0.3%*

Focuses on dna sequencing of plants such as rice (and possibily human cells & tissues) to detect and assess the genetic effects of cloning.

Cluster 10   (Size: 131,   ISim: 0.041,   ESim: 0.005)

<u>*Descriptive*</u>*: beta 27.8%, compound 6.6%, alpha 3.8%, cyclodextrin 2.9%, nmr 2.8%, beta.cyclodextrin 1.8%, isol 1.7%, elucid 1.5%, glucopyranosyl 1.3%, beta.glucopyranosyl 1.2%, structur.elucid 1.2%, structur 1.2%, inclus 1.0%, spectroscop 0.9%, new 0.9%, synthes 0.7%, acid 0.6%, glucopyranosid 0.6%, inclus.complex 0.6%, new.compound 0.5%, alpha.beta 0.5%, glycosid 0.5%, methyl 0.5%, aryl 0.4%, deriv 0.4%, two.new 0.4%, 3beta 0.4%, alpha.beta.unsatur 0.4%, unsatur 0.4%, beta.unsatur 0.4%*

<u>*Discriminating*</u>*: beta 17.0%, compound 3.2%, cyclodextrin 2.0%, alpha 1.7%, nmr 1.6%, beta.cyclodextrin 1.2%, elucid 0.9%, glucopyranosyl 0.9%, beta.glucopyranosyl 0.8%, structur.elucid 0.8%, isol 0.7%, model 0.7%, film 0.7%, system 0.6%, temperatur 0.6%, inclus 0.5%, spectroscop 0.5%, increas 0.4%, cell 0.4%, glucopyranosid 0.4%, surfac 0.4%, inclus.complex 0.4%, field 0.4%, new.compound 0.4%, glycosid 0.3%, time 0.3%, method 0.3%, alpha.beta 0.3%, phase 0.3%, high 0.3%*

Focuses on the effects of compounds and enzymes for immunology studies using nmr and spectroscopic techniques.

Cluster 11   (Size: 145,   ISim: 0.042,   ESim: 0.006)

<u>*Descriptive*</u>*: control 17.8%, system 11.6%, chaotic 7.0%, chao 2.7%, synchron 2.3%, feedback 1.7%, power 1.7%, dynam 1.3%, control.system 0.9%, attractor 0.9%, oscil 0.8%, chaotic.system 0.8%, design 0.8%, adapt 0.7%, power.system 0.7%, fuzzi 0.7%, nonlinear 0.7%, paramet 0.6%, paper 0.6%, coupl 0.6%, lorenz 0.6%, time 0.5%, voltag 0.5%, simul 0.5%, optim 0.5%, bifurc 0.5%, linear 0.5%, numer 0.4%, output 0.4%, delai 0.4%*

<u>*Discriminating*</u>*: control 11.0%, chaotic 5.5%, system 4.9%, chao 2.1%, synchron 1.7%, feedback 1.2%, temperatur 0.9%, film 0.8%, power 0.8%, control.system 0.7%, chaotic.system 0.7%, attractor 0.6%, power.system 0.5%, cell 0.5%, crystal 0.5%, increas 0.5%, structur 0.5%, dynam 0.5%, reaction 0.5%, adapt 0.5%, lorenz 0.5%, surfac 0.4%, group 0.4%, phase 0.4%, oscil 0.4%, fuzzi 0.4%, field 0.4%, acid 0.3%, bifurc 0.3%, energi 0.3%*

Focuses on modeling and simulation of control system theory for dynamic feedback to power systems using fuzzy logic, linear and non-linear techniques.

Cluster 12 (Size: 123, ISim: 0.041, ESim: 0.005)

Descriptive: state 14.3%, quantum 8.0%, entangl 4.9%, hole 3.9%, black.hole 3.4%, black 3.3%, field 2.8%, coher 2.0%, spin 1.9%, entropi 1.6%, coupl 1.3%, squeez 1.0%, entangl.state 1.0%, horizon 0.9%, oscil 0.8%, atom 0.7%, coher.state 0.6%, mode 0.5%, teleport 0.5%, brick.wall 0.5%, two 0.5%, ground.state 0.5%, oper 0.4%, brick 0.4%, dot 0.4%, theori 0.4%, quantum.mechan 0.4%, photon 0.4%, ground 0.4%, trap 0.4%

Discriminating: state 7.7%, quantum 5.1%, entangl 3.6%, hole 2.6%, black.hole 2.6%, black 2.4%, coher 1.3%, spin 1.0%, entropi 1.0%, squeez 0.8%, field 0.7%, entangl.state 0.7%, structur 0.7%, cell 0.7%, horizon 0.6%, film 0.6%, activ 0.5%, reaction 0.5%, temperatur 0.4%, coher.state 0.4%, surfac 0.4%, high 0.4%, crystal 0.4%, coupl 0.4%, teleport 0.4%, complex 0.4%, method 0.4%, increas 0.4%, brick.wall 0.4%, oscil 0.4%

Focuses on the quantum states and properties of atomic particles and their interactions in black holes.

Cluster 13 (Size: 165, ISim: 0.040, ESim: 0.005)

Descriptive: protein 22.6%, sequenc 4.7%, amino.acid 2.8%, amino 2.7%, express 2.4%, acid 1.5%, human 1.4%, gene 1.4%, cdna 1.2%, fusion 1.2%, isol 1.2%, bind 1.0%, peptid 1.0%, recombin 1.0%, activ 0.8%, residu 0.8%, encod 0.8%, strain 0.8%, termin 0.8%, purifi 0.8%, plasmid 0.8%, hcv 0.8%, antibodi 0.7%, enzym 0.7%, clone 0.6%, fusion.protein 0.6%, coli 0.5%, domain 0.5%, viru 0.5%, mutant 0.4%

Discriminating: protein 15.1%, sequenc 2.6%, amino.acid 1.9%, amino 1.7%, cdna 0.9%, fusion 0.8%, temperatur 0.8%, express 0.8%, film 0.8%, model 0.8%, system 0.7%, peptid 0.6%, human 0.6%, recombin 0.6%, hcv 0.5%, plasmid 0.5%, phase 0.5%, isol 0.5%, encod 0.5%, purifi 0.5%, bind 0.5%, termin 0.5%, fusion.protein 0.5%, antibodi 0.4%, surfac 0.4%, solut 0.4%, crystal 0.4%, field 0.4%, residu 0.4%, state 0.4%

Focuses on sequencing of proteins and amino acids .

Cluster 14 (Size: 157, ISim: 0.040, ESim: 0.006)

Descriptive: nanowir 9.2%, nanotub 5.0%, electron 4.5%, microscopi 3.5%, electron.microscopi 3.4%, transmiss.electron 2.6%, transmiss.electron.microscopi 2.3%, diamet 2.3%, nanorod 2.2%, transmiss 2.1%, carbon.nanotub 2.0%, diffract

1.8%, carbon 1.7%, cnt 1.4%, growth 1.3%, rai 1.2%, nanoparticl 1.1%, tem 0.8%, electron.diffract 0.8%, nanocryst 0.8%, crystal 0.6%, structur 0.6%, templat 0.6%, nanostructur 0.5%, rai.diffract 0.5%, oxid 0.5%, arrai 0.5%, microscopi.tem 0.4%, electron.microscopi.tem 0.4%, hrtem 0.4%

Discriminating: nanowir 7.2%, nanotub 3.8%, electron.microscopi 2.4%, microscopi 2.2%, electron 1.9%, transmiss.electron 1.8%, nanorod 1.8%, transmiss.electron.microscopi 1.7%, carbon.nanotub 1.5%, diamet 1.5%, transmiss 1.2%, cnt 1.1%, diffract 0.8%, system 0.8%, film 0.7%, carbon 0.7%, cell 0.7%, electron.diffract 0.6%, nanoparticl 0.6%, model 0.6%, activ 0.6%, nanocryst 0.6%, tem 0.5%, two 0.4%, group 0.4%, growth 0.4%, method 0.4%, templat 0.4%, complex 0.4%, nanostructur 0.4%

Focuses on the study of nanotechnology such as nanowires, carbon nanotubes using transmission electron microscopy.

Cluster 15 (Size: 127, ISim: 0.038, ESim: 0.005)

Descriptive: decai 8.7%, quark 6.6%, gamma 2.6%, model 2.0%, energi 1.7%, detector 1.7%, gev 1.5%, meson 1.4%, collis 1.4%, branch 1.3%, data 1.2%, phi 1.2%, cross.section 1.1%, neutron 1.0%, hadron 1.0%, isospin 1.0%, measur 1.0%, state 1.0%, baryon 1.0%, branch.ratio 1.0%, section 0.9%, mass 0.9%, gluon 0.8%, mev 0.8%, pion 0.8%, cross 0.8%, relativist 0.7%, nucleon 0.7%, proton 0.7%, qcd 0.6%

Discriminating: decai 6.0%, quark 4.8%, gamma 1.2%, detector 1.1%, gev 1.1%, meson 1.0%, collis 0.9%, branch 0.8%, hadron 0.8%, isospin 0.7%, phi 0.7%, film 0.7%, neutron 0.7%, cross.section 0.7%, baryon 0.7%, temperatur 0.7%, branch.ratio 0.7%, cell 0.7%, structur 0.7%, method 0.6%, gluon 0.6%, pion 0.6%, mev 0.5%, nucleon 0.5%, relativist 0.5%, activ 0.5%, surfac 0.5%, qcd 0.5%, section 0.5%, asymmetri 0.4%

Focuses on particle physics modeling & characterizing of the energy states of such elementary particles as protons, neutrons, gamma rays, quarks, mesons, darons, baryons, and gluons.

Cluster 16 (Size: 130, ISim: 0.036, ESim: 0.004)

Descriptive: speci 26.9%, china 5.2%, new.speci 3.6%, genu 2.7%, popul 2.5%, nov 1.7%, new 1.5%, genet 0.9%, fungal 0.8%, yunnan 0.7%, sequenc 0.7%, male 0.6%, two 0.6%, fungi 0.6%, fern 0.6%, specimen 0.6%, famili 0.6%, diploid 0.5%, genera 0.5%, provinc 0.5%, polymorph 0.5%, femal 0.4%, speci.genu 0.4%, chines 0.4%, three 0.4%, commun 0.4%, group 0.3%, type 0.3%, marker 0.3%, divers 0.3%

<u>Discriminating</u>: speci 16.9%, china 2.9%, new.speci 2.5%, genu 1.8%, popul 1.4%, nov 1.2%, model 0.7%, film 0.7%, temperatur 0.6%, system 0.6%, method 0.6%, fungal 0.5%, phase 0.5%, structur 0.5%, cell 0.5%, yunnan 0.5%, crystal 0.4%, genet 0.4%, surfac 0.4%, fungi 0.4%, solut 0.4%, fern 0.4%, activ 0.4%, increas 0.4%, reaction 0.4%, male 0.4%, diploid 0.4%, genera 0.3%, state 0.3%, energi 0.3%

Focuses on Chinese species of fungi.

Cluster 17 (Size: 172, ISim: 0.036, ESim: 0.006)

<u>Descriptive</u>: complex 19.3%, ligand 6.8%, coordin 4.1%, h2o 2.7%, structur 1.9%, crystal 1.6%, atom 1.5%, bond 1.3%, bridg 1.3%, spectra 1.2%, synthes 1.1%, copper 1.0%, ion 1.0%, hydrogen.bond 0.9%, iii 0.9%, clo4 0.9%, eta 0.8%, rai 0.8%, dimension 0.7%, two 0.7%, hydrogen 0.7%, interact 0.7%, element 0.6%, phen 0.6%, fluoresc 0.6%, bi 0.6%, group 0.6%, carboxyl 0.6%, crystal.structur 0.5%, nmr 0.5%

<u>Discriminating</u>: complex 12.0%, ligand 4.9%, coordin 2.8%, h2o 1.7%, bridg 0.8%, model 0.8%, film 0.8%, cell 0.7%, clo4 0.7%, method 0.7%, system 0.6%, hydrogen.bond 0.6%, copper 0.5%, surfac 0.5%, eta 0.5%, temperatur 0.5%, increas 0.5%, phase 0.5%, bond 0.5%, iii 0.4%, atom 0.4%, spectra 0.4%, phen 0.4%, field 0.4%, activ 0.4%, pph3 0.4%, control 0.3%, paper 0.3%, carboxyl 0.3%, time 0.3%

Focuses on synthesizing and characterizing the bonding properties of complex microstructures such as ligands, crystals of copper, hydrogen, and carboxyl.

Cluster 18 (Size: 284, ISim: 0.036, ESim: 0.005)

<u>Descriptive</u>: cell 44.5%, express 2.7%, apoptosi 2.5%, tumor 2.1%, cultur 1.3%, activ 1.1%, cell.line 1.0%, human 0.9%, cancer 0.9%, protein 0.8%, line 0.7%, inhibit 0.7%, prolifer 0.6%, induc 0.6%, tissu 0.6%, carcinoma 0.5%, stain 0.5%, hcc 0.5%, growth 0.5%, cytotox 0.3%, telomeras 0.3%, gene 0.3%, assai 0.3%, mrna 0.3%, tumor.cell 0.3%, detect 0.3%, regul 0.3%, dna 0.3%, product 0.3%, level 0.3%

<u>Discriminating</u>: cell 29.4%, apoptosi 1.8%, tumor 1.2%, express 1.0%, cultur 0.8%, temperatur 0.8%, film 0.8%, cell.line 0.7%, system 0.6%, model 0.6%, structur 0.5%, cancer 0.5%, crystal 0.5%, human 0.4%, prolifer 0.4%, solut 0.4%, surfac 0.4%, method 0.4%, reaction 0.4%, phase 0.4%, paper 0.3%, base 0.3%, state 0.3%, properti 0.3%, stain 0.3%, carcinoma 0.3%, two 0.3%, field 0.3%, complex 0.3%, measur 0.3%

Focuses on cell physiology of human tissues, proteins, and genes for cancer/tumors.

Cluster 19 (Size: 216, ISim: 0.037, ESim: 0.006)

<u>*Descriptive*</u>*: alloi 31.1%, microstructur 2.8%, grain 2.6%, corros 2.1%, steel 1.9%, deform 1.8%, disloc 1.4%, melt 1.2%, phase 1.1%, temperatur 1.1%, tial 1.0%, precipit 1.0%, increas 0.9%, strain 0.7%, stress 0.6%, heat 0.6%, degreesc 0.6%, boundari 0.6%, martensit 0.6%, gamma 0.6%, alpha 0.6%, eutect 0.6%, hydrogen 0.6%, cast 0.6%, ag 0.5%, mechan 0.5%, grain.boundari 0.5%, resist 0.5%, process 0.5%, rate 0.4%*

<u>*Discriminating*</u>*: alloi 24.8%, microstructur 1.8%, grain 1.5%, corros 1.5%, steel 1.3%, deform 1.1%, disloc 1.0%, tial 0.9%, system 0.8%, method 0.7%, film 0.7%, melt 0.7%, model 0.7%, cell 0.6%, precipit 0.6%, martensit 0.5%, group 0.4%, eutect 0.4%, reaction 0.4%, two 0.4%, complex 0.4%, function 0.4%, activ 0.4%, field 0.4%, cast 0.4%, acid 0.3%, grain.boundari 0.3%, patient 0.3%, weld 0.3%, crystal 0.3%*

Focuses on the microstructure and material properties of steel alloys.

Cluster 20 (Size: 144, ISim: 0.032, ESim: 0.006)

<u>*Descriptive*</u>*: cluster 5.8%, isom 5.4%, bond 3.5%, energi 3.4%, structur 3.0%, orbit 2.0%, atom 1.9%, molecul 1.6%, aren 1.3%, ring 1.3%, b3lyp 1.2%, state 1.1%, porphyrin 1.0%, dissoci 1.0%, stabl 1.0%, molecular 0.9%, calcul 0.9%, spectra 0.8%, calix 0.8%, 31g 0.8%, calix.aren 0.7%, kcal 0.7%, ci 0.6%, mol 0.6%, geometri 0.6%, stabil 0.6%, kcal.mol 0.6%, stm 0.6%, reaction 0.6%, densiti.function 0.5%*

<u>*Discriminating*</u>*: isom 4.5%, cluster 3.9%, bond 1.9%, orbit 1.4%, energi 1.3%, aren 1.1%, b3lyp 1.0%, porphyrin 0.8%, model 0.8%, film 0.8%, molecul 0.8%, dissoci 0.7%, cell 0.7%, ring 0.7%, temperatur 0.7%, calix 0.7%, atom 0.7%, 31g 0.6%, calix.aren 0.6%, kcal 0.6%, kcal.mol 0.5%, structur 0.5%, stm 0.5%, system 0.5%, ci 0.5%, stabl 0.5%, increas 0.4%, field 0.4%, control 0.4%, densiti.function 0.4%*

Focuses on the atomic and molecular properties of isomers.

Cluster 21 (Size: 161, ISim: 0.031, ESim: 0.006)

<u>*Descriptive*</u>*: polymer 7.1%, copolym 4.4%, polym 4.3%, chitosan 3.9%, graft 3.4%, poli 2.9%, molecular.weight 2.7%, monom 2.4%, molecular 2.3%, weight 2.0%, micel 1.5%, hydrogel 1.0%, radic 1.0%, methyl 1.0%, concentr 0.9%, aggreg 0.9%, methacryl 0.9%, crosslink 0.8%, solvent 0.8%, water 0.8%, initi 0.7%, solut 0.7%, acid 0.7%, increas 0.6%, group 0.5%, reaction 0.5%, chain 0.5%, temperatur 0.5%, acryl 0.5%, copolymer 0.4%*

<u>*Discriminating*</u>*: polymer 5.4%, copolym 3.4%, chitosan 3.2%, polym 2.7%, graft 2.6%, molecular.weight 2.1%, poli 2.1%, monom 1.9%, micel 1.2%, molecular 1.1%, weight 1.0%, hydrogel 0.8%, methacryl 0.7%, model 0.7%, crosslink 0.6%, cell*

0.6%, radic 0.6%, aggreg 0.6%, methyl 0.5%, film 0.5%, method 0.4%, system 0.4%, solvent 0.4%, field 0.4%, two 0.4%, acryl 0.4%, copolymer 0.4%, lldpe 0.4%, patient 0.3%, express 0.3%

Focuses on characterizing the properties and reactions of polymers.

Cluster 22 (Size: 184, ISim: 0.031, ESim: 0.006)

Descriptive: wave 22.6%, field 8.5%, magnet 5.1%, magnet.field 1.7%, crack 1.5%, electr 1.0%, plate 1.0%, equat 0.9%, current 0.7%, soliton 0.7%, theori 0.7%, propag 0.7%, electr.field 0.6%, numer 0.6%, dipol 0.6%, instabl 0.5%, reflect 0.5%, plasma 0.5%, frequenc 0.5%, displac 0.5%, dimension 0.4%, stress 0.4%, method 0.4%, piezoelectr 0.4%, two 0.4%, dispers 0.4%, shell 0.4%, system 0.3%, surfac 0.3%, mode 0.3%

Discriminating: wave 18.9%, field 4.9%, magnet 3.0%, magnet.field 1.3%, crack 0.9%, film 0.9%, temperatur 0.8%, plate 0.7%, activ 0.6%, cell 0.6%, soliton 0.6%, reaction 0.6%, dipol 0.5%, increas 0.5%, electr 0.5%, acid 0.4%, group 0.4%, process 0.4%, electr.field 0.4%, instabl 0.4%, propag 0.4%, structur 0.4%, phase 0.4%, complex 0.4%, crystal 0.4%, patient 0.3%, displac 0.3%, new 0.3%, gene 0.3%, compound 0.3%

Focuses on waves & magnetic field properties associated with plasmas and piezoelectric surfaces.

Cluster 23 (Size: 245, ISim: 0.030, ESim: 0.005)

Descriptive: equat 14.4%, solut 8.9%, condit 2.3%, nonlinear 1.9%, boundari 1.8%, exist 1.7%, suffici.condit 1.7%, suffici 1.5%, system 1.5%, stabil 1.4%, linear 1.2%, paper 1.2%, differenti.equat 1.0%, method 1.0%, global 1.0%, function 0.9%, infin 0.8%, delai 0.7%, differenti 0.7%, converg 0.7%, integr 0.7%, asymptot 0.6%, boundari.valu 0.6%, order 0.6%, solv 0.6%, iter 0.5%, singular 0.5%, numer 0.5%, bound 0.5%, equal 0.5%

Discriminating: equat 9.4%, solut 4.5%, suffici.condit 1.3%, suffici 1.1%, nonlinear 1.0%, temperatur 0.9%, boundari 0.8%, film 0.8%, differenti.equat 0.8%, exist 0.7%, condit 0.7%, cell 0.7%, structur 0.6%, global 0.6%, increas 0.6%, phase 0.6%, crystal 0.5%, stabil 0.5%, infin 0.5%, activ 0.5%, reaction 0.5%, boundari.valu 0.4%, delai 0.4%, linear 0.4%, high 0.4%, asymptot 0.4%, converg 0.4%, surfac 0.4%, group 0.4%, acid 0.4%

Focuses on the elements of numerical mathematics such equations, conditions, and solutions associated with boundary value problems of system stability.

Cluster 24 (Size: 177, ISim: 0.030, ESim: 0.006)

<u>Descriptive</u>: flow 14.6%, veloc 4.6%, turbul 4.1%, heat 3.1%, model 2.5%, fluid 2.2%, scale 1.4%, pressur 1.4%, ga 1.1%, simul 1.1%, convect 1.0%, equat 0.9%, particl 0.9%, numer 0.8%, experiment 0.8%, number 0.7%, transfer 0.6%, heat.transfer 0.6%, combust 0.6%, flux 0.6%, water 0.5%, measur 0.5%, field 0.5%, comput 0.5%, bed 0.5%, region 0.5%, layer 0.4%, coeffici 0.4%, air 0.4%, dimension 0.4%

<u>Discriminating</u>: flow 12.1%, turbul 3.8%, veloc 3.7%, heat 2.0%, fluid 1.6%, convect 0.8%, film 0.8%, scale 0.7%, cell 0.7%, pressur 0.6%, ga 0.6%, reaction 0.5%, heat.transfer 0.5%, activ 0.5%, crystal 0.5%, group 0.4%, acid 0.4%, electron 0.4%, bed 0.4%, structur 0.4%, combust 0.4%, patient 0.4%, model 0.3%, complex 0.3%, properti 0.3%, composit 0.3%, flux 0.3%, reynold 0.3%, numer 0.3%, gene 0.3%

Focuses on modeling and simulation of the fluid dynamic and thermodynamic properties of particles in water and air.

Cluster 25 (Size: 245, ISim: 0.028, ESim: 0.006)

<u>Descriptive</u>: electrod 11.5%, mol 4.9%, determin 4.3%, detect 2.6%, electrochem 1.7%, acid 1.6%, detect.limit 1.5%, dna 1.5%, ion 1.4%, method.determin 1.2%, sampl 1.2%, rang 1.1%, modifi 1.0%, limit 1.0%, method 1.0%, solut 0.9%, sensor 0.9%, concentr 0.8%, oxid 0.8%, surfac 0.7%, linear 0.7%, reaction 0.7%, potenti 0.6%, sensit 0.6%, voltammetri 0.6%, immobil 0.5%, peak 0.5%, fluoresc 0.5%, cyclic 0.4%, buffer 0.4%

<u>Discriminating</u>: electrod 9.1%, mol 3.4%, determin 3.3%, detect 1.3%, electrochem 1.2%, detect.limit 1.2%, method.determin 1.0%, model 0.8%, temperatur 0.7%, structur 0.7%, dna 0.6%, cell 0.6%, sensor 0.6%, field 0.5%, system 0.5%, voltammetri 0.5%, limit 0.5%, modifi 0.5%, film 0.4%, two 0.4%, increas 0.4%, ion 0.4%, acid 0.4%, energi 0.4%, immobil 0.3%, modifi.electrod 0.3%, express 0.3%, patient 0.3%, ecl 0.3%, linear.rang 0.3%

Focuses on detection methods and limitations of using eclectrodes to exploit the ectrochemical properties of dna.

Cluster 26 (Size: 210, ISim: 0.028, ESim: 0.006)

<u>Descriptive</u>: imag 8.2%, network 6.8%, neural 3.6%, error 3.3%, neural.network 3.2%, model 2.9%, method 2.4%, estim 2.2%, recognit 1.6%, inform 1.6%, data 1.4%, wavelet 1.4%, base 1.3%, reconstruct 1.2%, accuraci 1.2%, fuzzi 1.0%, paper 0.8%, algorithm 0.7%, paramet 0.7%, comput 0.6%, featur 0.6%, new 0.6%, train 0.6%, nois 0.5%, techniqu 0.5%, simul 0.5%, optim 0.5%, scheme 0.4%, extract 0.4%, object 0.4%

<u>Discriminating</u>: imag 6.2%, network 5.1%, neural 3.0%, neural.network 2.7%, error 2.4%, estim 1.5%, recognit 1.3%, wavelet 1.2%, inform 1.0%, temperatur 1.0%, reconstruct 0.9%, film 0.9%, accuraci 0.8%, cell 0.8%, fuzzi 0.7%, crystal 0.6%, reaction 0.5%, increas 0.5%, phase 0.5%, model 0.5%, train 0.5%, activ 0.4%, field 0.4%, state 0.4%, solut 0.4%, structur 0.4%, electron 0.4%, data 0.4%, energi 0.4%, group 0.3%

Focuses on image processing techniques and reconstruction algorithms using neural networks, wavelets, and fuzzy logic to extract features and objects.

Cluster 27 (Size: 219, ISim: 0.028, ESim: 0.006)

<u>Descriptive</u>: composit 9.7%, coat 5.2%, sic 4.7%, strength 4.0%, crack 2.3%, al2o3 1.9%, fractur 1.7%, fiber 1.5%, materi 1.3%, interfac 1.3%, properti 1.2%, tough 1.2%, mechan.properti 1.2%, matrix 1.1%, mechan 1.0%, reinforc 0.9%, layer 0.9%, sinter 0.9%, ceram 0.8%, microstructur 0.8%, tensil 0.7%, mpa 0.7%, tic 0.6%, stress 0.6%, grain 0.6%, particl 0.6%, lamin 0.6%, surfac 0.5%, temperatur 0.5%, fractur.tough 0.5%

<u>Discriminating</u>: composit 6.4%, sic 3.9%, coat 3.7%, strength 2.8%, crack 1.6%, fractur 1.3%, al2o3 1.3%, tough 1.0%, fiber 1.0%, mechan.properti 0.9%, film 0.8%, model 0.8%, cell 0.8%, interfac 0.7%, reinforc 0.7%, tensil 0.5%, matrix 0.5%, activ 0.5%, system 0.5%, method 0.5%, tic 0.5%, mpa 0.5%, sinter 0.5%, field 0.5%, group 0.5%, fractur.tough 0.4%, state 0.4%, lamin 0.4%, complex 0.4%, sialon 0.4%

Focuses on the material properties of al2o3, coatings, fibers, ceramics, laminates and microstructures.

Cluster 28 (Size: 217, ISim: 0.026, ESim: 0.004)

<u>Descriptive</u>: rat 8.4%, activ 4.5%, induc 3.6%, inhibit 3.0%, ca2 2.8%, receptor 2.5%, express 2.0%, neuron 1.9%, cell 1.6%, protein 1.4%, mrna 1.4%, stimul 1.2%, increas 0.9%, concentr 0.9%, mice 0.8%, level 0.7%, inject 0.7%, lp 0.6%, kinas 0.6%, regul 0.5%, mediat 0.5%, antagonist 0.5%, treatment 0.5%, decreas 0.5%, depend 0.4%, inhibitor 0.4%, hsc 0.4%, dai 0.4%, cultur 0.4%, membran 0.4%

<u>Discriminating</u>: rat 6.0%, ca2 2.0%, inhibit 1.8%, induc 1.8%, receptor 1.7%, activ 1.5%, neuron 1.3%, mrna 0.9%, temperatur 0.8%, stimul 0.8%, film 0.8%, structur 0.7%, model 0.6%, express 0.6%, system 0.6%, phase 0.5%, mice 0.5%, crystal 0.5%, surfac 0.5%, lp 0.5%, method 0.4%, two 0.4%, kinas 0.4%, field 0.4%, protein 0.4%, solut 0.4%, reaction 0.4%, base 0.4%, antagonist 0.4%, electron 0.4%

Focuses on the study of manipulating the structure and functions of biological macromolecules such as neurons, cells, proteins, and mRNA from rats and mice for genetic research.

Cluster 29 (Size: 196, ISim: 0.026, ESim: 0.005)

<u>Descriptive</u>: reaction 26.9%, yield 4.8%, product 1.5%, synthes 1.3%, synthesi 1.1%, aldehyd 1.0%, aryl 0.9%, coupl 0.9%, alcohol 0.8%, chiral 0.7%, acid 0.7%, good.yield 0.7%, good 0.7%, catalyz 0.7%, solvent 0.6%, condit 0.6%, allyl 0.6%, reaction.mechan 0.6%, radic 0.5%, mechan 0.5%, high 0.5%, carbon 0.5%, temperatur 0.5%, rate 0.5%, energi 0.5%, reagent 0.4%, alkyl 0.4%, compound 0.4%, methyl 0.4%, rate.constant 0.4%

<u>Discriminating</u>: reaction 17.6%, yield 3.0%, film 0.8%, aldehyd 0.8%, cell 0.7%, aryl 0.7%, model 0.6%, structur 0.6%, system 0.6%, good.yield 0.6%, synthesi 0.5%, alcohol 0.5%, catalyz 0.4%, chiral 0.4%, field 0.4%, synthes 0.4%, allyl 0.4%, reaction.mechan 0.4%, product 0.4%, two 0.4%, surfac 0.4%, crystal 0.4%, method 0.4%, measur 0.3%, coupl.reaction 0.3%, control 0.3%, patient 0.3%, phase 0.3%, increas 0.3%, reagent 0.3%

Focuses on the reactions, synthesis, and properties of organic compounds.

Cluster 30 (Size: 222, ISim: 0.024, ESim: 0.004)

<u>Descriptive</u>: algebra 4.7%, theorem 3.5%, paper 3.4%, let 3.1%, equal 3.0%, prove 2.8%, graph 2.5%, function 2.3%, conjectur 2.1%, space 1.9%, number 1.6%, gener 1.5%, set 1.4%, bound 1.3%, inequ 1.3%, class 1.2%, polynomi 1.0%, regular 1.0%, formula 1.0%, exist 0.8%, finit 0.8%, invari 0.8%, connect 0.7%, oper 0.7%, vertic 0.6%, construct 0.5%, case 0.5%, sigma 0.5%, equival 0.5%, lambda 0.5%

<u>Discriminating</u>: algebra 3.4%, theorem 2.5%, let 2.3%, prove 1.9%, graph 1.8%, equal 1.6%, conjectur 1.5%, paper 1.1%, inequ 0.9%, space 0.9%, temperatur 0.8%, film 0.8%, polynomi 0.7%, bound 0.7%, class 0.7%, cell 0.6%, model 0.6%, regular 0.6%, function 0.6%, set 0.6%, number 0.6%, activ 0.6%, phase 0.5%, formula 0.5%, increas 0.5%, invari 0.5%, crystal 0.5%, method 0.4%, gener 0.4%, reaction 0.4%

Focuses on mathematical theories of algebra.

Cluster 31 (Size: 179, ISim: 0.024, ESim: 0.004)

<u>Descriptive</u>: risk 3.7%, women 3.3%, ag 3.0%, group 2.9%, chines 1.8%, cancer 1.7%, genotyp 1.4%, week 1.3%, control 1.2%, year 1.1%, popul 1.0%, rat 0.8%, hpv 0.8%, diseas 0.7%, blood 0.7%, case 0.7%, health 0.7%, kong 0.7%, incid 0.7%, hong 0.7%, pregnanc 0.7%, hong.kong 0.7%, abort 0.6%, men 0.6%, preval 0.6%, smoke 0.6%, cervic 0.6%, infant 0.6%, polymorph 0.5%, allel 0.5%

<u>Discriminating</u>: risk 2.7%, women 2.5%, ag 1.7%, chines 1.1%, cancer 1.0%, genotyp 0.9%, group 0.9%, week 0.8%, temperatur 0.8%, film 0.8%, structur 0.7%,

hpv 0.6%, system 0.6%, cell 0.6%, model 0.6%, year 0.6%, crystal 0.5%, abort 0.5%, health 0.5%, phase 0.5%, pregnanc 0.5%, popul 0.5%, men 0.4%, solut 0.4%, surfac 0.4%, infant 0.4%, kong 0.4%, hong 0.4%, cervic 0.4%, incid 0.4%

Focuses on the health risks that smoking has on men and women, and in particular to pregnant women in China & Hong Kong, and the incident rates related to infants, miscarriages/abortions, diseases, and cancer such as cervical cancer.

Cluster 32 (Size: 264, ISim: 0.024, ESim: 0.006)

Descriptive: laser 8.6%, optic 6.5%, beam 6.1%, mode 3.6%, frequenc 2.9%, puls 2.3%, pump 2.2%, wavelength 1.5%, power 1.5%, waveguid 0.9%, switch 0.8%, harmon 0.8%, shift 0.7%, effici 0.7%, propag 0.7%, measur 0.6%, light 0.6%, nonlinear 0.6%, theoret 0.6%, phase 0.5%, output 0.5%, field 0.5%, photon 0.5%, signal 0.5%, period 0.5%, wave 0.5%, radiat 0.4%, intens 0.4%, diod 0.4%, system 0.4%

Discriminating: laser 6.7%, beam 4.9%, optic 4.8%, mode 2.4%, pump 1.8%, puls 1.7%, frequenc 1.6%, wavelength 1.1%, film 0.9%, temperatur 0.8%, power 0.8%, waveguid 0.7%, harmon 0.6%, reaction 0.6%, cell 0.6%, activ 0.5%, switch 0.5%, increas 0.5%, model 0.4%, propag 0.4%, acid 0.4%, complex 0.4%, patient 0.4%, shift 0.4%, photon 0.4%, gaussian.beam 0.4%, output 0.3%, diod 0.3%, second.harmon 0.3%, gene 0.3%

Focuses on the physics of lasers, optics, and waveguides.

Cluster 33 (Size: 203, ISim: 0.024, ESim: 0.006)

Descriptive: system 7.5%, design 4.2%, servic 2.4%, paper 2.4%, scheme 2.2%, cost 1.7%, model 1.6%, base 1.4%, custom 1.3%, process 1.0%, product 1.0%, manag 1.0%, compon 0.9%, agent 0.9%, optim 0.8%, user 0.7%, construct 0.7%, method 0.7%, time 0.7%, build 0.7%, simul 0.6%, environ 0.6%, polici 0.6%, oper 0.6%, protocol 0.6%, inform 0.5%, implement 0.5%, resourc 0.5%, issu 0.5%, nois 0.5%

Discriminating: system 3.0%, design 2.8%, servic 2.2%, scheme 1.4%, cost 1.4%, custom 1.2%, temperatur 0.9%, film 0.8%, paper 0.8%, manag 0.7%, cell 0.7%, reaction 0.6%, user 0.6%, crystal 0.5%, surfac 0.5%, agent 0.5%, phase 0.5%, build 0.5%, polici 0.5%, activ 0.5%, protocol 0.5%, resourc 0.4%, electron 0.4%, field 0.4%, compon 0.4%, issu 0.4%, properti 0.4%, demand 0.4%, acid 0.4%, environ 0.3%

Focuses on system design, service, cost, modeling of process, and management.

Cluster 34 (Size: 247, ISim: 0.023, ESim: 0.005)

<u>Descriptive</u>: soil 14.3%, plant 4.5%, root 1.8%, concentr 1.7%, china 1.5%, water 1.2%, climat 1.0%, sediment 1.0%, wheat 1.0%, dai 1.0%, increas 0.9%, year 0.7%, season 0.7%, veget 0.7%, summer 0.7%, growth 0.6%, crop 0.6%, seed 0.6%, total 0.6%, forest 0.6%, winter 0.6%, rice 0.5%, seedl 0.5%, isol 0.5%, monsoon 0.5%, rate 0.5%, area 0.5%, land 0.5%, biomass 0.4%, organ 0.4%

<u>Discriminating</u>: soil 11.6%, plant 3.1%, root 1.3%, film 0.9%, china 0.8%, climat 0.8%, cell 0.7%, wheat 0.7%, sediment 0.7%, structur 0.6%, system 0.6%, method 0.6%, crystal 0.6%, season 0.6%, phase 0.5%, model 0.5%, summer 0.5%, reaction 0.5%, veget 0.5%, crop 0.5%, concentr 0.5%, dai 0.5%, winter 0.5%, forest 0.5%, seedl 0.4%, temperatur 0.4%, monsoon 0.4%, state 0.4%, properti 0.4%, seed 0.4%

Focuses on how seasonal environmental changes of water affect the growth rates and production of agricultural crops such as wheat and rice, plant vegetation, and forests in different areas of China.

Cluster 35 (Size: 247, ISim: 0.022, ESim: 0.006)

<u>Descriptive</u>: particl 6.3%, powder 6.1%, blend 3.9%, surfac 2.5%, size 2.4%, tio2 2.1%, coal 2.0%, nano 1.7%, materi 1.3%, temperatur 1.1%, calcin 1.1%, phase 1.0%, particl.size 0.9%, zro2 0.9%, crystal 0.9%, xrd 0.8%, nanocomposit 0.7%, morpholog 0.7%, nanoparticl 0.7%, crystallin 0.7%, structur 0.7%, thermal 0.7%, coat 0.6%, nanomet 0.6%, composit 0.6%, content 0.6%, increas 0.6%, dispers 0.6%, zn 0.6%, zno 0.6%

<u>Discriminating</u>: powder 5.1%, particl 4.4%, blend 3.7%, coal 1.8%, tio2 1.6%, nano 1.5%, size 1.2%, calcin 1.0%, film 0.9%, cell 0.8%, system 0.8%, particl.size 0.8%, model 0.8%, zro2 0.7%, surfac 0.7%, nanocomposit 0.6%, nanomet 0.6%, zn 0.5%, two 0.5%, xrd 0.5%, complex 0.5%, crystallin 0.5%, nanoparticl 0.5%, zno 0.4%, materi 0.4%, patient 0.4%, morpholog 0.4%, group 0.4%, express 0.4%, surfac.area 0.4%

Focuses on characterizing material properties of nanoparticles, powders, coatings, and crystal structures comprised of tio2, zro2, zn, and zno using X-ray diffraction (xrd).

Cluster 36 (Size: 287, ISim: 0.021, ESim: 0.006)

<u>Descriptive</u>: temperatur 9.6%, crystal 8.1%, dope 2.5%, electron 1.9%, emiss 1.3%, pressur 1.3%, sampl 1.2%, phase 1.1%, measur 1.0%, laser 1.0%, glass 1.0%, high 0.9%, transit 0.9%, state 0.9%, linbo3 0.9%, intens 0.9%, increas 0.8%, conduct 0.8%, spectra 0.8%, anneal 0.7%, excit 0.7%, energi 0.7%, thermal 0.7%, grown 0.6%, peak 0.6%, absorpt 0.5%, rang 0.5%, materi 0.5%, oxygen 0.4%, electr 0.4%

<u>Discriminating</u>: temperatur 5.7%, crystal 5.6%, dope 2.1%, film 1.0%, linbo3 0.9%, cell 0.9%, emiss 0.9%, model 0.8%, glass 0.7%, electron 0.7%, pressur 0.7%,

group 0.6%, grown 0.5%, method 0.5%, reaction 0.5%, complex 0.5%, patient 0.5%, intens 0.5%, activ 0.4%, laser 0.4%, system 0.4%, excit 0.4%, control 0.4%, express 0.4%, gene 0.4%, acid 0.4%, conduct 0.4%, solut 0.4%, anneal 0.4%, luminesc 0.3%

Focuses on characterizing material properties of crystals.

Cluster 37 (Size: 272, ISim: 0.020, ESim: 0.006)

Descriptive: model 18.8%, simul 3.4%, data 1.4%, predict 1.3%, test 1.3%, numer 1.1%, experiment 1.0%, crack 0.9%, stress 0.9%, dynam 0.9%, method 0.9%, paramet 0.8%, load 0.8%, theoret 0.7%, element 0.7%, coeffici 0.6%, agreement 0.6%, indent 0.6%, finit 0.6%, field 0.5%, finit.element 0.5%, traffic 0.5%, base 0.5%, paper 0.5%, distribut 0.4%, process 0.4%, measur 0.4%, comput 0.4%, structur 0.4%, linear 0.4%

Discriminating: model 14.8%, simul 2.3%, film 1.2%, cell 1.0%, predict 1.0%, crystal 0.7%, test 0.7%, system 0.6%, numer 0.6%, crack 0.6%, traffic 0.6%, indent 0.5%, finit.element 0.5%, reaction 0.5%, temperatur 0.5%, load 0.5%, acid 0.5%, data 0.5%, patient 0.5%, increas 0.5%, stress 0.4%, agreement 0.4%, control 0.4%, dynam 0.4%, electron 0.4%, catalyst 0.3%, theoret 0.3%, finit 0.3%, oxid 0.3%, rotor 0.3%

Focuses on refining modeling and simulations of structural damage.

Cluster 38 (Size: 233, ISim: 0.020, ESim: 0.006)

Descriptive: energi 3.2%, calcul 2.4%, theori 1.8%, mass 1.7%, densiti 1.5%, star 1.4%, model 1.4%, function 1.2%, interact 1.2%, potenti 1.1%, correl 1.1%, galaxi 0.9%, paramet 0.8%, state 0.8%, line 0.8%, two 0.8%, perturb 0.8%, bodi 0.8%, rotat 0.7%, orbit 0.7%, system 0.7%, band 0.6%, time 0.6%, region 0.6%, equat 0.6%, distribut 0.5%, observ 0.5%, method 0.5%, approxim 0.5%, particl 0.4%

Discriminating: calcul 1.7%, energi 1.6%, star 1.6%, mass 1.2%, film 1.1%, galaxi 1.1%, cell 1.0%, theori 1.0%, densiti 0.8%, temperatur 0.7%, perturb 0.7%, reaction 0.6%, rotat 0.6%, correl 0.6%, crystal 0.6%, orbit 0.6%, acid 0.5%, control 0.5%, bodi 0.5%, patient 0.5%, interact 0.5%, complex 0.4%, composit 0.4%, potenti 0.4%, ira 0.4%, gene 0.4%, opac 0.4%, structur 0.4%, solut 0.4%, surfac 0.3%

Focuses on astropyhsics theory and calculations of stars and galaxies and their physical properties and motions.

Cluster 39 (Size: 259, ISim: 0.019, ESim: 0.006)

Descriptive: acid 6.9%, adsorpt 6.5%, water 4.9%, extract 4.1%, membran 1.5%, phase 1.3%, surfact 1.3%, solvent 1.3%, solut 1.2%, concentr 1.1%, aqueou 1.0%, carbon 1.0%, separ 1.0%, liquid 0.8%, salt 0.8%, organ 0.8%, surfac 0.6%,

mixtur 0.6%, adsorb 0.6%, capac 0.5%, pore 0.5%, resin 0.5%, oil 0.5%, equilibrium 0.5%, amino.acid 0.5%, amino 0.4%, temperatur 0.4%, ion 0.4%, column 0.4%, isotherm 0.4%

<u>Discriminating</u>: adsorpt 6.0%, acid 4.6%, extract 3.3%, water 3.2%, surfact 1.1%, film 1.0%, membran 1.0%, solvent 0.9%, aqueou 0.7%, cell 0.7%, salt 0.6%, field 0.5%, separ 0.5%, structur 0.4%, adsorb 0.4%, model 0.4%, patient 0.4%, paper 0.4%, resin 0.4%, liquid 0.4%, mixtur 0.4%, carbon 0.4%, gene 0.3%, oil 0.3%, crystal 0.3%, base 0.3%, pore 0.3%, function 0.3%, microemuls 0.3%, express 0.3%

Focuses on physical chemistry properties and interactions of various elements on films, membranes, resins, and crystal surfaces to include water, acids, oils, salts, carbon.

Table A10A-1. Base Clusters of Cluto 40-Cluster Analysis (SCI Index) -

Based On ==>		**CLUTO**
DATA SOURCE ==>		**SCI INDEX**
# ITEMS ==>		**40 CLUSTERS**
CLUSTER #	# RECORDS	**DESCRIPTION**
0	154	physical characterization of crystal structures and compounds.
1	80	geological changes to different regions of China.
2	104	electromagnetic properties of superconductors.
3	181	physical chemistry properties of catalyst and reactions of materials such as polymers, al2o3, hydrogen, sio2, ethylene, oxygen, and zeolite.
4	76	methods of ion implantation on substrates and films and characterizing their physical properties.
5	210	symptoms, diagnosis, and success of treatments in Chinese patients with diseases and cancer, primarily associated with the breast, eyes, and arteries.
6	198	physical properties of ceramic materials.
7	362	physical properties of thin films and substrates.
8	155	efficiencies of genetic modeling, simulations and algorithms using techniques such as fuzzy logic.
9	199	dna sequencing of plants such as rice (and possibily human cells & tissues) to detect and assess the genetic effects of cloning.
10	131	effects of compounds and enzymes for immunology studies using nmr and spectroscopic techniques.
11	145	modeling and simulation of control system theory for dynamic feedback to power systems using fuzzy logic, linear and non-linear techniques.
12	123	quantum states and properties of atomic particles and their interactions in black holes.
13	165	sequencing of proteins and amino acids .
14	157	study of nanotechnology such as nanowires, carbon nanotubes using transmission electron microscopy.
15	127	particle physics modeling & characterizing of the energy states of such elementary particles as protons, neutrons, gamma rays, quarks, mesons, darons, baryons, and gluons.
16	130	Chinese species of fungi.

17	172	synthesizing and characterizing the bonding properties of complex microstructures such as ligands, crystals of copper, hydrogen, and carboxyl.
18	284	cell physiology of human tissues, proteins, and genes for cancer/tumors.
19	216	microstructure and material properties of steel alloys.
20	144	atomic and molecular properties of isomers.
21	161	characterizing the properties and reactions of polymers.
22	184	waves & magnetic field properties associated with plasmas and piezoelectric surfaces.
23	245	elements of numerical mathematics such equations, conditions, and solutions associated with boundary value problems of system stability.
24	177	modeling and simulation of the fluid dynamic and thermodynamic properties of particles in water and air.
25	245	detection methods and limitations of using eclectrodes to exploit the ectrochemical properties of dna.
26	210	image processing techniques and reconstruction algorithms using neural networks, wavelets, and fuzzy logic to extract features and objects.
27	219	material properties of al2o3, coatings, fibers, ceramics, laminates and microstructures.
28	217	study of manipulating the structure and functions of biological macromolecules such as neurons, cells, proteins, and mRNA from rats and mice for genetic research.
29	196	reactions, synthesis, and properties of organic compounds.
30	222	mathematical theories of algebra.
31	179	health risks that smoking has on men and women, and in particular to pregnant women in China & Hong Kong, and the incident rates related to infants, miscarriages/abortions, diseases, and cancer such as cervical cancer.
32	264	physics of lasers, optics, and waveguides.
33	203	system design, service, cost, modeling of process, and management.
34	247	how seasonal environmental changes of water affect the growth rates and production of agricultural crops such as wheat and rice, plant vegetation, and forests in different areas of China.
35	247	characterizing material properties of nanoparticles, powders, coatings, and crystal structures comprised of tio2, zro2, zn, and zno using X-ray diffraction (xrd).
36	287	characterizing material properties of crystals.
37	272	refining modeling and simulations of structural damage.
38	233	astropyhsics theory and calculations of stars and galaxies and their physical properties and motions.
39	259	physical chemistry properties and interactions of various elements on films, membranes, resins, and crystal surfaces to include water, acids, oils, salts, carbon.

--

Hierarchical Tree that optimizes the I2 criterion function.

This section shows the hierarchical tree that defines the taxonomy. The numbers listed are the cluster numbers. The elemental clusters above are at the rightmost boundary of the tree.

```
78
|-----75
|   |---------------67
|   |           |---------------------------53
|   |           |                    |-----------------------------28
|   |           |                    |-----------------------------18
|   |           |---------------------------------------47
|   |                                         |-----------------13
|   |                                         |-----------------9
|   |---------70
|           |---------------------------------------50
|           |                            |-----------------------5
|           |                            |-----------------------31
|           |-------------------------57
|                              |-----------------------45
|                              |                 |-------------16
|                              |                 |-------------1
|                              |-------------------------------------34
|-77
 |-----74
 |    |---------69
 |    |      |-----------------60
 |    |      |            |-------------------------------44
 |    |      |            |                       |-----------33
 |    |      |            |                       |-----------11
 |    |      |            |---------------------------46
 |    |      |                                 |---------------26
 |    |      |                                 |---------------8
 |    |      |-----------------------------54
 |    |                            |-------------------------------30
 |    |                            |-------------------------------23
 |    |---------------66
 |                |-----63
 |                |   |---------------------------------------43
 |                |   |                            |---------24
 |                |   |                            |---------37
 |                |   |-------------------------------------------41
 |                |                                   |-----22
 |                |                                   |-----2
 |                |---------------58
 |                            |-------------51
 |                            |         |-------------------------12
 |                            |         |-------------------------15
 |                            |-------------------------------42
 |                                                   |-------38
 |                                                   |-------20
 |-76
  |-----73
  |   |---71
  |   |  |-----------65
  |   |  |        |-----------59
  |   |  |        |        |-----------------------------------------32
  |   |  |        |        |-------------------------------------40
  |   |  |        |                                    |---4
  |   |  |        |                                    |---36
  |   |  |        |----------------------------------------------------6
  |   |  |-------------64
```

```
|    |             |---------------56
|    |             |            |-----------------------------------27
|    |             |            |-----------------------------------19
|    |             |-----------------------52
|    |                                |---------------------------35
|    |                                |---------------------------14
|    |---------------------------------------------------------------------7
|-------72
      |-------68
      |     |-------------61
      |     |          |---------------------------------------------25
      |     |          |-----------------------49
      |     |                             |---------------------39
      |     |                             |---------------------21
      |     |-----------62
      |              |-----------------------------------------------3
      |              |-------------55
      |                        |---------------------------------29
      |                        |---------------------------------10
      |-----------------------------------------------48
                                   |-------------------0
                                   |-------------------17
```

78 (Size: 7780, ISim: 6.20e-003, XSim: 0.00e+000, Gain: -8.24e+001)

system 1.1%, temperatur 1.1%, method 1.1%, model 1.1%, structur 1.0%, film 1.0%, cell 0.9%, two 0.8%, phase 0.7%, increas 0.7%, activ 0.7%, surfac 0.7%, crystal 0.6%, high 0.6%, reaction 0.6%, solut 0.6%, time 0.6%, base 0.6%, field 0.6%, measur 0.5%, group 0.5%, process 0.5%, new 0.5%, state 0.5%, complex 0.5%, paper 0.5%, properti 0.5%, scienc 0.5%, energi 0.5%

75 (Size: 1711, ISim: 1.12e-002, XSim: 3.77e-003, Gain: -3.50e+001)

cell 6.8%, patient 4.2%, gene 3.5%, express 2.5%, protein 2.5%, activ 1.6%, group 1.2%, sequenc 1.0%, speci 0.9%, dna 0.8%, plant 0.8%, china 0.8%, tumor 0.8%, human 0.7%, rat 0.7%, concentr 0.7%, induc 0.6%, level 0.6%, soil 0.6%, treatment 0.6%, ag 0.6%, increas 0.6%, dai 0.6%, cancer 0.6%, inhibit 0.5%, control 0.5%, isol 0.5%, detect 0.5%, cultur 0.4%

67 (Size: 865, ISim: 1.92e-002, XSim: 6.26e-003, Gain: -2.05e+001)

cell 14.4%, gene 6.6%, express 5.5%, protein 5.3%, activ 2.2%, dna 1.4%, sequenc 1.2%, induc 1.2%, human 1.1%, tumor 1.1%, inhibit 1.0%, rat 1.0%, apoptosi 0.8%, mrna 0.6%, cultur 0.6%, pcr 0.6%, receptor 0.6%, detect 0.6%, tissu 0.6%, regul 0.5%, level 0.5%, isol 0.5%, acid 0.4%, clone 0.4%, plant 0.4%, mice 0.4%, concentr 0.4%, assai 0.4%, bind 0.4%

53 (Size: 501, ISim: 2.36e-002, XSim: 1.21e-002, Gain: -1.20e+001)

cell 27.4%, express 3.2%, activ 2.9%, rat 2.0%, induc 2.0%, inhibit 1.9%, apoptosi 1.7%, protein 1.4%, cultur 1.2%, tumor 1.1%, receptor 1.0%, mrna 0.9%, neuron 0.7%, ca2 0.7%, human 0.6%, concentr 0.6%, level 0.6%, mice 0.6%, increas 0.6%, stimul 0.5%, tissu 0.5%, prolifer 0.5%, regul 0.5%, cell.line 0.5%, cancer 0.4%, growth 0.4%, assai 0.4%, stain 0.4%, line 0.4%

28 (Size: 217, ISim: 2.62e-002, XSim: 1.46e-002, Gain: +0.00e+000)

rat 8.4%, activ 4.5%, induc 3.6%, inhibit 3.0%, ca2 2.8%, receptor 2.5%, express 2.0%, neuron 1.9%, cell 1.6%, protein 1.4%, mrna 1.4%, stimul 1.2%, increas 0.9%, concentr 0.9%, mice 0.8%, level 0.7%, inject 0.7%, lp 0.6%, kinas 0.6%, regul 0.5%, mediat 0.5%, antagonist 0.5%, treatment 0.5%, decreas 0.5%, depend 0.4%, inhibitor 0.4%, hsc 0.4%, dai 0.4%, cultur 0.4%

18 (Size: 284, ISim: 3.58e-002, XSim: 1.46e-002, Gain: +0.00e+000)

cell 44.5%, express 2.7%, apoptosi 2.5%, tumor 2.1%, cultur 1.3%, activ 1.1%, cell.line 1.0%, human 0.9%, cancer 0.9%, protein 0.8%, line 0.7%, inhibit 0.7%, prolifer 0.6%, induc 0.6%, tissu 0.6%, carcinoma 0.5%, stain 0.5%, hcc 0.5%, growth 0.5%, cytotox 0.3%, telomeras 0.3%, gene 0.3%, assai 0.3%, mrna 0.3%, tumor.cell 0.3%, detect 0.3%, regul 0.3%, dna 0.3%, product 0.3%

47 (Size: 364, ISim: 3.03e-002, XSim: 1.21e-002, Gain: -1.02e+001)

gene 17.7%, protein 8.7%, express 5.1%, sequenc 3.9%, dna 2.9%, pcr 1.4%, genom 1.2%, clone 1.2%, amino.acid 1.0%, human 1.0%, amino 1.0%, cdna 0.9%, plant 0.9%, mutat 0.8%, chromosom 0.8%, isol 0.7%, cell 0.7%, encod 0.6%, transgen 0.6%, strain 0.6%, transcript 0.6%, acid 0.6%, bind 0.6%, activ 0.6%, detect 0.5%, viru 0.5%, region 0.5%, fusion 0.5%, plasmid 0.5%

13 (Size: 165, ISim: 3.98e-002, XSim: 1.95e-002, Gain: +0.00e+000)

protein 22.6%, sequenc 4.7%, amino.acid 2.8%, amino 2.7%, express 2.4%, acid 1.5%, human 1.4%, gene 1.4%, cdna 1.2%, fusion 1.2%, isol 1.2%, bind 1.0%, peptid 1.0%, recombin 1.0%, activ 0.8%, residu 0.8%, encod 0.8%, strain 0.8%, termin 0.8%, purifi 0.8%, plasmid 0.8%, hcv 0.8%, antibodi 0.7%, enzym 0.7%, clone 0.6%, fusion.protein 0.6%, coli 0.5%, domain 0.5%, viru 0.5%

9 (Size: 199, ISim: 4.17e-002, XSim: 1.95e-002, Gain: +0.00e+000)

gene 31.5%, dna 5.3%, express 5.2%, pcr 2.0%, genom 1.8%, sequenc 1.7%, plant 1.4%, transgen 1.4%, chromosom 1.2%, mutat 1.1%, clone 1.1%, tumor 0.9%, gene.express 0.8%, transcript 0.8%, genet 0.7%, cell 0.7%, rice 0.7%, protein 0.6%, promot 0.5%, detect 0.5%, region 0.4%, allel 0.4%, regul 0.4%, human 0.4%, tissu 0.4%, line 0.4%, cdna 0.4%, intron 0.4%, polymorph 0.3%

70 (Size: 846, ISim: 1.29e-002, XSim: 6.26e-003, Gain: -2.34e+001)

patient 11.5%, speci 2.4%, china 2.4%, group 2.2%, soil 2.1%, ag 1.7%, year 1.0%, chines 0.9%, popul 0.9%, treatment 0.8%, plant 0.8%, dai 0.8%, control 0.7%, diseas 0.6%, concentr 0.5%, month 0.5%, total 0.5%, rate 0.5%, case 0.5%, two 0.5%, increas 0.5%, genotyp 0.5%, risk 0.4%, region 0.4%, cancer 0.4%, level 0.4%, arteri 0.4%, higher 0.4%, root 0.4%

50 (Size: 389, ISim: 2.45e-002, XSim: 5.90e-003, Gain: -1.05e+001)

patient 28.5%, group 3.3%, ag 1.4%, diseas 1.4%, cancer 1.1%, risk 1.1%, treatment 1.0%, month 1.0%, case 1.0%, chines 1.0%, arteri 0.9%, year 0.9%, women 0.9%, control 0.7%, week 0.7%, score 0.6%, lesion 0.5%, dai 0.5%, genotyp 0.5%, blood 0.5%, diagnosi 0.4%, breast 0.4%, outcom 0.4%, bone 0.4%, serum 0.4%, mean 0.4%, test 0.4%, object 0.3%, surgeri 0.3%

5 (Size: 210, ISim: 4.37e-002, XSim: 1.37e-002, Gain: +0.00e+000)

patient 49.3%, group 2.1%, arteri 1.5%, diseas 1.2%, month 1.0%, treatment 1.0%, case 0.7%, lesion 0.7%, tumor 0.7%, diagnosi 0.6%, surgeri 0.5%, score 0.4%, year 0.4%, symptom 0.4%, cancer 0.4%, surviv 0.4%, dai 0.3%, mean 0.3%, acut 0.3%, ag 0.3%, breast 0.3%, therapi 0.3%, method 0.3%, ey 0.3%, rate 0.3%, chines 0.3%, outcom 0.3%, recurr 0.3%, test 0.2%

31 (Size: 179, ISim: 2.37e-002, XSim: 1.37e-002, Gain: +0.00e+000)

risk 3.7%, women 3.3%, ag 3.0%, group 2.9%, chines 1.8%, cancer 1.7%, genotyp 1.4%, week 1.3%, control 1.2%, year 1.1%, popul 1.0%, rat 0.8%, hpv 0.8%, diseas 0.7%, blood 0.7%, case 0.7%, health 0.7%, kong 0.7%, incid 0.7%, hong 0.7%, pregnanc 0.7%, hong.kong 0.7%, abort 0.6%, men 0.6%, preval 0.6%, smoke 0.6%, cervic 0.6%, infant 0.6%, polymorph 0.5%

57 (Size: 457, ISim: 1.65e-002, XSim: 5.90e-003, Gain: -1.27e+001)

speci 6.5%, soil 5.7%, china 4.9%, plant 2.2%, popul 0.9%, ag 0.8%, root 0.8%, concentr 0.8%, rock 0.8%, south 0.7%, sediment 0.7%, new.speci 0.6%, north 0.6%, climat 0.6%, water 0.6%, region 0.6%, genu 0.6%, new 0.6%, area 0.5%, sequenc 0.5%, two 0.5%, metamorph 0.5%, dai 0.5%, wheat 0.5%, isol 0.5%, earli 0.4%, increas 0.4%, year 0.4%, season 0.4%

45 (Size: 210, ISim: 2.64e-002, XSim: 8.61e-003, Gain: -9.53e+000)

speci 14.4%, china 6.1%, new.speci 1.9%, rock 1.8%, genu 1.6%, popul 1.3%, ag 1.2%, metamorph 1.2%, north 1.1%, south 1.0%, nov 1.0%, sequenc 0.9%, new 0.9%, earli 0.9%, provinc 0.7%, zircon 0.7%, zone 0.6%, late 0.6%, basin 0.5%,

yunnan 0.5%, genet 0.5%, region 0.5%, two 0.5%, type 0.4%, eclogit 0.4%, middl 0.4%, fungal 0.4%, block 0.4%, specimen 0.4%

16 (Size: 130, ISim: 3.62e-002, XSim: 9.36e-003, Gain: +0.00e+000)

speci 26.9%, china 5.2%, new.speci 3.6%, genu 2.7%, popul 2.5%, nov 1.7%, new 1.5%, genet 0.9%, fungal 0.8%, yunnan 0.7%, sequenc 0.7%, male 0.6%, two 0.6%, fungi 0.6%, fern 0.6%, specimen 0.6%, famili 0.6%, diploid 0.5%, genera 0.5%, provinc 0.5%, polymorph 0.5%, femal 0.4%, speci.genu 0.4%, chines 0.4%, three 0.4%, commun 0.4%, group 0.3%, type 0.3%, marker 0.3%

1 (Size: 80, ISim: 5.59e-002, XSim: 9.36e-003, Gain: +0.00e+000)

rock 6.0%, metamorph 4.0%, ag 3.1%, zircon 2.1%, china 2.1%, north 1.9%, zone 1.7%, earli 1.4%, basin 1.4%, late 1.4%, eclogit 1.4%, south 1.3%, mantl 1.1%, granit 1.1%, volcan 1.0%, tecton 1.0%, fault 0.9%, belt 0.8%, dabi 0.8%, block 0.8%, miner 0.8%, deposit 0.7%, uhp 0.7%, orogen 0.7%, faci 0.6%, continent 0.6%, fauna 0.6%, upper 0.6%, dyke 0.6%

34 (Size: 247, ISim: 2.27e-002, XSim: 8.61e-003, Gain: +0.00e+000)

soil 14.3%, plant 4.5%, root 1.8%, concentr 1.7%, china 1.5%, water 1.2%, climat 1.0%, sediment 1.0%, wheat 1.0%, dai 1.0%, increas 0.9%, year 0.7%, season 0.7%, veget 0.7%, summer 0.7%, growth 0.6%, crop 0.6%, seed 0.6%, total 0.6%, forest 0.6%, winter 0.6%, rice 0.5%, seedl 0.5%, isol 0.5%, monsoon 0.5%, rate 0.5%, area 0.5%, land 0.5%, biomass 0.4%

77 (Size: 6069, ISim: 7.18e-003, XSim: 3.77e-003, Gain: -6.96e+001)

temperatur 1.4%, film 1.4%, model 1.3%, system 1.3%, structur 1.2%, method 1.1%, phase 1.0%, crystal 0.9%, surfac 0.8%, solut 0.8%, reaction 0.8%, two 0.7%, field 0.7%, state 0.7%, properti 0.7%, paper 0.6%, process 0.6%, high 0.6%, electron 0.6%, energi 0.6%, base 0.6%, measur 0.6%, complex 0.6%, time 0.6%, increas 0.6%, scienc 0.5%, equat 0.5%, new 0.5%, condit 0.5%

74 (Size: 2544, ISim: 9.67e-003, XSim: 5.05e-003, Gain: -3.35e+001)

model 3.9%, system 2.7%, paper 1.6%, method 1.5%, equat 1.5%, algorithm 1.4%, field 1.4%, state 1.2%, magnet 1.1%, function 1.1%, simul 1.0%, base 0.8%, two 0.8%, energi 0.8%, solut 0.8%, wave 0.7%, time 0.7%, paramet 0.7%, theori 0.7%, control 0.7%, numer 0.6%, data 0.6%, new 0.6%, gener 0.6%, order 0.6%, dynam 0.5%, structur 0.5%, comput 0.5%, flow 0.5%

69 (Size: 1180, ISim: 1.35e-002, XSim: 6.93e-003, Gain: -2.23e+001)

system 4.7%, algorithm 4.2%, paper 3.1%, control 1.8%, method 1.8%, equat 1.7%, model 1.5%, solut 1.4%, network 1.2%, function 1.1%, base 1.0%, design 1.0%, optim 0.9%, gener 0.9%, new 0.8%, imag 0.8%, condit 0.8%, error 0.8%, scheme 0.7%, exist 0.7%, linear 0.7%, time 0.6%, equal 0.6%, construct 0.6%, set 0.6%, integr 0.6%, fuzzi 0.6%, oper 0.6%, comput 0.6%

60 (Size: 713, ISim: 1.76e-002, XSim: 8.49e-003, Gain: -1.42e+001)

algorithm 8.0%, system 5.7%, control 3.0%, model 2.4%, network 2.3%, paper 1.9%, method 1.9%, design 1.6%, base 1.6%, imag 1.5%, optim 1.2%, scheme 1.1%, error 1.0%, simul 1.0%, fuzzi 0.9%, neural 0.8%, new 0.8%, time 0.8%, comput 0.8%, chaotic 0.8%, neural.network 0.7%, process 0.7%, data 0.6%, inform 0.6%, paramet 0.6%, dynam 0.6%, power 0.5%, estim 0.5%, machin 0.5%

44 (Size: 348, ISim: 2.19e-002, XSim: 1.19e-002, Gain: -9.36e+000)

system 13.1%, control 8.0%, design 3.1%, chaotic 2.3%, paper 1.9%, scheme 1.6%, power 1.3%, model 1.3%, base 1.1%, dynam 0.9%, chao 0.9%, optim 0.9%, servic 0.9%, synchron 0.9%, time 0.8%, simul 0.8%, process 0.8%, method 0.7%, feedback 0.7%, cost 0.7%, new 0.5%, oper 0.5%, custom 0.5%, paramet 0.4%, fuzzi 0.4%, compon 0.4%, product 0.4%, construct 0.4%, control.system 0.4%

33 (Size: 203, ISim: 2.35e-002, XSim: 1.36e-002, Gain: +0.00e+000)

system 7.5%, design 4.2%, servic 2.4%, paper 2.4%, scheme 2.2%, cost 1.7%, model 1.6%, base 1.4%, custom 1.3%, process 1.0%, product 1.0%, manag 1.0%, compon 0.9%, agent 0.9%, optim 0.8%, user 0.7%, construct 0.7%, method 0.7%, time 0.7%, build 0.7%, simul 0.6%, environ 0.6%, polici 0.6%, oper 0.6%, protocol 0.6%, inform 0.5%, implement 0.5%, resourc 0.5%, issu 0.5%

11 (Size: 145, ISim: 4.19e-002, XSim: 1.36e-002, Gain: +0.00e+000)

control 17.8%, system 11.6%, chaotic 7.0%, chao 2.7%, synchron 2.3%, feedback 1.7%, power 1.7%, dynam 1.3%, control.system 0.9%, attractor 0.9%, oscil 0.8%, chaotic.system 0.8%, design 0.8%, adapt 0.7%, power.system 0.7%, fuzzi 0.7%, nonlinear 0.7%, paramet 0.6%, paper 0.6%, coupl 0.6%, lorenz 0.6%, time 0.5%, voltag 0.5%, simul 0.5%, optim 0.5%, bifurc 0.5%, linear 0.5%, numer 0.4%, output 0.4%

46 (Size: 365, ISim: 2.47e-002, XSim: 1.19e-002, Gain: -9.97e+000)

algorithm 19.2%, imag 4.0%, network 3.7%, model 2.4%, method 2.2%, error 2.0%, neural 1.7%, neural.network 1.4%, base 1.3%, paper 1.1%, data 1.0%, comput 1.0%, estim 1.0%, fuzzi 0.9%, optim 0.9%, reconstruct 0.8%, new 0.8%, simul 0.7%, inform 0.7%, recognit 0.7%, machin 0.7%, object 0.6%, accuraci 0.6%, wavelet 0.6%, paramet 0.5%, system 0.5%, schedul 0.5%, time 0.4%, set 0.4%

26 (Size: 210, ISim: 2.79e-002, XSim: 1.57e-002, Gain: +0.00e+000)

imag 8.2%, network 6.8%, neural 3.6%, error 3.3%, neural.network 3.2%, model 2.9%, method 2.4%, estim 2.2%, recognit 1.6%, inform 1.6%, data 1.4%, wavelet 1.4%, base 1.3%, reconstruct 1.2%, accuraci 1.2%, fuzzi 1.0%, paper 0.8%, algorithm 0.7%, paramet 0.7%, comput 0.6%, featur 0.6%, new 0.6%, train 0.6%, nois 0.5%, techniqu 0.5%, simul 0.5%, optim 0.5%, scheme 0.4%, extract 0.4%

8 (Size: 155, ISim: 4.34e-002, XSim: 1.57e-002, Gain: +0.00e+000)

algorithm 47.5%, schedul 1.5%, method 1.0%, optim 0.9%, comput 0.8%, model 0.8%, paper 0.8%, converg 0.7%, genet.algorithm 0.7%, simul 0.6%, base 0.6%, machin 0.6%, object 0.5%, genet 0.5%, job 0.5%, new 0.5%, line 0.4%, fuzzi 0.4%, minim 0.4%, iter 0.4%, code 0.4%, network 0.4%, search 0.3%, system 0.3%, solv 0.3%, approxim 0.3%, complex 0.3%, program 0.3%, time 0.3%

54 (Size: 467, ISim: 1.92e-002, XSim: 8.49e-003, Gain: -1.20e+001)

equat 6.4%, solut 4.2%, paper 2.8%, function 2.0%, equal 1.9%, algebra 1.8%, exist 1.8%, condit 1.7%, theorem 1.5%, prove 1.5%, system 1.2%, gener 1.1%, bound 1.1%, class 1.0%, space 1.0%, let 1.0%, nonlinear 0.9%, boundari 0.9%, linear 0.9%, set 0.9%, suffici 0.8%, integr 0.7%, inequ 0.7%, suffici.condit 0.7%, number 0.7%, order 0.7%, graph 0.7%, finit 0.7%, stabil 0.7%

30 (Size: 222, ISim: 2.39e-002, XSim: 1.12e-002, Gain: +0.00e+000)

algebra 4.7%, theorem 3.5%, paper 3.4%, let 3.1%, equal 3.0%, prove 2.8%, graph 2.5%, function 2.3%, conjectur 2.1%, space 1.9%, number 1.6%, gener 1.5%, set 1.4%, bound 1.3%, inequ 1.3%, class 1.2%, polynomi 1.0%, regular 1.0%, formula 1.0%, exist 0.8%, finit 0.8%, invari 0.8%, connect 0.7%, oper 0.7%, vertic 0.6%, construct 0.5%, case 0.5%, sigma 0.5%, equival 0.5%

23 (Size: 245, ISim: 2.99e-002, XSim: 1.12e-002, Gain: +0.00e+000)

equat 14.4%, solut 8.9%, condit 2.3%, nonlinear 1.9%, boundari 1.8%, exist 1.7%, suffici.condit 1.7%, suffici 1.5%, system 1.5%, stabil 1.4%, linear 1.2%, paper 1.2%, differenti.equat 1.0%, method 1.0%, global 1.0%, function 0.9%, infin 0.8%, delai 0.7%, differenti 0.7%, converg 0.7%, integr 0.7%, asymptot 0.6%, boundari.valu 0.6%, order 0.6%, solv 0.6%, iter 0.5%, singular 0.5%, numer 0.5%, bound 0.5%

66 (Size: 1364, ISim: 1.15e-002, XSim: 6.93e-003, Gain: -1.98e+001)

model 4.8%, magnet 3.1%, field 3.1%, state 2.3%, energi 1.9%, wave 1.6%, calcul 1.0%, simul 0.9%, theori 0.9%, flow 0.9%, two 0.8%, experiment 0.8%, method 0.7%, structur 0.7%, equat 0.7%, paramet 0.7%, measur 0.7%, data 0.6%,

quantum 0.6%, function 0.6%, numer 0.6%, system 0.6%, coupl 0.6%, interact 0.6%, veloc 0.6%, densiti 0.5%, mass 0.5%, potenti 0.5%, time 0.5%

63 (Size: 737, ISim: 1.52e-002, XSim: 8.13e-003, Gain: -1.66e+001)

magnet 6.9%, model 6.7%, field 4.5%, wave 3.6%, flow 2.2%, simul 1.8%, numer 1.1%, veloc 0.9%, experiment 0.8%, equat 0.8%, method 0.8%, magnet.field 0.7%, temperatur 0.7%, crack 0.7%, stress 0.6%, data 0.6%, heat 0.6%, dynam 0.6%, measur 0.5%, turbul 0.5%, fluid 0.5%, structur 0.5%, paramet 0.5%, electr 0.5%, scale 0.5%, pressur 0.5%, surfac 0.5%, distribut 0.5%, two 0.4%

43 (Size: 449, ISim: 1.75e-002, XSim: 9.38e-003, Gain: -9.27e+000)

model 12.9%, flow 4.7%, simul 2.9%, veloc 1.5%, numer 1.3%, turbul 1.2%, experiment 1.2%, data 1.2%, heat 1.0%, scale 0.9%, predict 0.8%, method 0.8%, dynam 0.8%, pressur 0.7%, coeffici 0.7%, field 0.7%, equat 0.7%, measur 0.6%, fluid 0.6%, comput 0.6%, test 0.6%, paramet 0.6%, stress 0.6%, ga 0.5%, distribut 0.5%, agreement 0.5%, theoret 0.5%, load 0.5%, time 0.4%

24 (Size: 177, ISim: 2.98e-002, XSim: 1.19e-002, Gain: +0.00e+000)

flow 14.6%, veloc 4.6%, turbul 4.1%, heat 3.1%, model 2.5%, fluid 2.2%, scale 1.4%, pressur 1.4%, ga 1.1%, simul 1.1%, convect 1.0%, equat 0.9%, particl 0.9%, numer 0.8%, experiment 0.8%, number 0.7%, transfer 0.6%, heat.transfer 0.6%, combust 0.6%, flux 0.6%, water 0.5%, measur 0.5%, field 0.5%, comput 0.5%, bed 0.5%, region 0.5%, layer 0.4%, coeffici 0.4%, air 0.4%

37 (Size: 272, ISim: 1.97e-002, XSim: 1.19e-002, Gain: +0.00e+000)

model 18.8%, simul 3.4%, data 1.4%, predict 1.3%, test 1.3%, numer 1.1%, experiment 1.0%, crack 0.9%, stress 0.9%, dynam 0.9%, method 0.9%, paramet 0.8%, load 0.8%, theoret 0.7%, element 0.7%, coeffici 0.6%, agreement 0.6%, indent 0.6%, finit 0.6%, field 0.5%, finit.element 0.5%, traffic 0.5%, base 0.5%, paper 0.5%, distribut 0.4%, process 0.4%, measur 0.4%, comput 0.4%, structur 0.4%

41 (Size: 288, ISim: 2.79e-002, XSim: 9.38e-003, Gain: -9.04e+000)

magnet 23.3%, wave 10.7%, field 8.9%, magnet.field 2.5%, electr 1.1%, temperatur 0.8%, electr.field 0.7%, crack 0.7%, ferromagnet 0.6%, current 0.6%, superconduct 0.6%, spin 0.6%, plate 0.5%, transit 0.5%, coupl 0.5%, magnet.properti 0.5%, theori 0.4%, equat 0.4%, properti 0.4%, phase 0.4%, electron 0.4%, structur 0.3%, propag 0.3%, soliton 0.3%, plasma 0.3%, numer 0.3%, two 0.3%, reflect 0.3%, extern 0.3%
]

22 (Size: 184, ISim: 3.12e-002, XSim: 1.70e-002, Gain: +0.00e+000)

wave 22.6%, field 8.5%, magnet 5.1%, magnet.field 1.7%, crack 1.5%, electr 1.0%, plate 1.0%, equat 0.9%, current 0.7%, soliton 0.7%, theori 0.7%, propag 0.7%, electr.field 0.6%, numer 0.6%, dipol 0.6%, instabl 0.5%, reflect 0.5%, plasma 0.5%, frequenc 0.5%, displac 0.5%, dimension 0.4%, stress 0.4%, method 0.4%, piezoelectr 0.4%, two 0.4%, dispers 0.4%, shell 0.4%, system 0.3%, surfac 0.3%

2 (Size: 104, ISim: 5.63e-002, XSim: 1.70e-002, Gain: +0.00e+000)

magnet 41.5%, field 3.9%, temperatur 2.4%, magnet.field 2.0%, magnet.properti 1.7%, transit 1.7%, spin 1.5%, ferromagnet 1.4%, magnetoresist 0.9%, properti 0.8%, phase 0.7%, superconduct 0.7%, coupl 0.6%, antiferromagnet 0.6%, coerciv 0.5%, curi 0.5%, increas 0.5%, electr 0.5%, microspher 0.5%, compound 0.5%, structur 0.4%, curi.temperatur 0.4%, electron 0.4%, electr.field 0.4%, sampl 0.4%, insul 0.3%, dope 0.3%, depend 0.3%, decreas 0.3%

58 (Size: 627, ISim: 1.44e-002, XSim: 8.13e-003, Gain: -1.30e+001)

state 5.4%, energi 4.1%, calcul 1.6%, quantum 1.4%, model 1.3%, theori 1.3%, cluster 1.3%, decai 1.2%, mass 1.1%, two 0.9%, orbit 0.9%, interact 0.8%, potenti 0.8%, densiti 0.8%, atom 0.8%, function 0.8%, quark 0.8%, field 0.8%, isom 0.7%, structur 0.7%, spin 0.7%, bond 0.7%, paramet 0.6%, entangl 0.6%, gamma 0.6%, system 0.6%, level 0.5%, coupl 0.5%, measur 0.5%

51 (Size: 250, ISim: 2.41e-002, XSim: 9.11e-003, Gain: -1.09e+001)

state 9.3%, decai 3.9%, quantum 3.8%, quark 2.7%, entangl 2.0%, hole 1.6%, field 1.6%, energi 1.4%, black.hole 1.4%, black 1.4%, model 1.3%, gamma 1.2%, spin 1.1%, coher 0.9%, measur 0.8%, coupl 0.7%, mass 0.7%, detector 0.7%, entropi 0.6%, gev 0.6%, branch 0.6%, two 0.6%, theori 0.6%, meson 0.6%, collis 0.6%, paramet 0.5%, data 0.5%, neutron 0.5%, phi 0.5%

12 (Size: 123, ISim: 4.07e-002, XSim: 8.72e-003, Gain: +0.00e+000)

state 14.3%, quantum 8.0%, entangl 4.9%, hole 3.9%, black.hole 3.4%, black 3.3%, field 2.8%, coher 2.0%, spin 1.9%, entropi 1.6%, coupl 1.3%, squeez 1.0%, entangl.state 1.0%, horizon 0.9%, oscil 0.8%, atom 0.7%, coher.state 0.6%, mode 0.5%, teleport 0.5%, brick.wall 0.5%, two 0.5%, ground.state 0.5%, oper 0.4%, brick 0.4%, dot 0.4%, theori 0.4%, quantum.mechan 0.4%, photon 0.4%, ground 0.4%

15 (Size: 127, ISim: 3.84e-002, XSim: 8.72e-003, Gain: +0.00e+000)

decai 8.7%, quark 6.6%, gamma 2.6%, model 2.0%, energi 1.7%, detector 1.7%, gev 1.5%, meson 1.4%, collis 1.4%, branch 1.3%, data 1.2%, phi 1.2%, cross.section 1.1%, neutron 1.0%, hadron 1.0%, isospin 1.0%, measur 1.0%, state 1.0%, baryon 1.0%, branch.ratio 1.0%, section 0.9%, mass 0.9%, gluon 0.8%, mev 0.8%, pion 0.8%, cross 0.8%, relativist 0.7%, nucleon 0.7%, proton 0.7%

,]

42 (Size: 377, ISim: 1.72e-002, XSim: 9.11e-003, Gain: -9.05e+000)

energi 4.6%, cluster 2.7%, calcul 2.3%, orbit 1.7%, isom 1.6%, bond 1.5%, structur 1.5%, state 1.3%, theori 1.3%, densiti 1.2%, interact 1.0%, function 0.9%, mass 0.9%, potenti 0.9%, atom 0.9%, two 0.7%, spectra 0.7%, b3lyp 0.7%, model 0.7%, molecular 0.7%, molecul 0.7%, correl 0.6%, star 0.6%, electron 0.6%, band 0.6%, charg 0.5%, densiti.function 0.5%, level 0.5%, order 0.5%

38 (Size: 233, ISim: 1.96e-002, XSim: 1.06e-002, Gain: +0.00e+000)

energi 3.2%, calcul 2.4%, theori 1.8%, mass 1.7%, densiti 1.5%, star 1.4%, model 1.4%, function 1.2%, interact 1.2%, potenti 1.1%, correl 1.1%, galaxi 0.9%, paramet 0.8%, state 0.8%, line 0.8%, two 0.8%, perturb 0.8%, bodi 0.8%, rotat 0.7%, orbit 0.7%, system 0.7%, band 0.6%, time 0.6%, region 0.6%, equat 0.6%, distribut 0.5%, observ 0.5%, method 0.5%, approxim 0.5%

20 (Size: 144, ISim: 3.22e-002, XSim: 1.06e-002, Gain: +0.00e+000)

cluster 5.8%, isom 5.4%, bond 3.5%, energi 3.4%, structur 3.0%, orbit 2.0%, atom 1.9%, molecul 1.6%, aren 1.3%, ring 1.3%, b3lyp 1.2%, state 1.1%, porphyrin 1.0%, dissoci 1.0%, stabl 1.0%, molecular 0.9%, calcul 0.9%, spectra 0.8%, calix 0.8%, 31g 0.8%, calix.aren 0.7%, kcal 0.7%, ci 0.6%, mol 0.6%, geometri 0.6%, stabil 0.6%, kcal.mol 0.6%, stm 0.6%, reaction 0.6%

76 (Size: 3525, ISim: 8.96e-003, XSim: 5.05e-003, Gain: -5.25e+001)

film 3.1%, temperatur 2.3%, crystal 1.8%, reaction 1.5%, phase 1.4%, structur 1.4%, surfac 1.1%, catalyst 0.9%, electron 0.9%, composit 0.9%, increas 0.8%, acid 0.8%, complex 0.8%, high 0.8%, oxid 0.8%, properti 0.8%, alloi 0.7%, ion 0.7%, beta 0.6%, rai 0.6%, materi 0.6%, compound 0.6%, process 0.5%, sampl 0.5%, solut 0.5%, atom 0.5%, synthes 0.5%, mechan 0.5%, layer 0.5%

73 (Size: 2026, ISim: 1.21e-002, XSim: 5.76e-003, Gain: -3.16e+001)

film 6.5%, temperatur 3.1%, phase 1.8%, crystal 1.5%, composit 1.5%, alloi 1.4%, electron 1.3%, surfac 1.1%, ceram 1.0%, properti 1.0%, increas 1.0%, materi 0.9%, structur 0.9%, laser 0.9%, high 0.8%, dielectr 0.8%, layer 0.7%, particl 0.7%, powder 0.7%, optic 0.7%, grain 0.7%, thin 0.7%, size 0.6%, coat 0.6%, deposit 0.6%, thin.film 0.6%, process 0.6%, measur 0.6%, anneal 0.6%

71 (Size: 1664, ISim: 1.14e-002, XSim: 1.01e-002, Gain: -2.58e+001)

temperatur 3.7%, phase 2.2%, alloi 2.0%, crystal 1.9%, composit 1.6%, ceram 1.5%, electron 1.5%, laser 1.2%, materi 1.2%, high 1.0%, increas 1.0%, properti 1.0%, powder 1.0%, surfac 0.9%, dielectr 0.9%, particl 0.9%, structur 0.9%, optic

0.7%, sampl 0.7%, size 0.7%, process 0.7%, mechan 0.7%, sinter 0.7%, coat 0.7%, grain 0.6%, measur 0.6%, beam 0.6%, microstructur 0.6%, layer 0.6%

65 (Size: 825, ISim: 1.45e-002, XSim: 7.86e-003, Gain: -1.93e+001)

temperatur 4.7%, ceram 3.1%, laser 3.1%, crystal 2.8%, dielectr 2.8%, phase 2.3%, optic 2.0%, beam 1.6%, frequenc 1.1%, ferroelectr 1.1%, electron 1.1%, dope 1.1%, mode 1.0%, measur 0.9%, ion 0.9%, sinter 0.9%, sampl 0.9%, high 0.9%, transit 0.8%, properti 0.6%, materi 0.6%, electr 0.6%, glass 0.6%, puls 0.6%, increas 0.6%, field 0.6%, wavelength 0.6%, structur 0.6%, polar 0.5%

59 (Size: 627, ISim: 1.50e-002, XSim: 8.93e-003, Gain: -1.39e+001)

laser 5.1%, temperatur 3.5%, crystal 3.4%, optic 3.2%, beam 2.5%, mode 1.5%, ion 1.3%, electron 1.3%, measur 1.1%, frequenc 1.1%, phase 1.0%, puls 1.0%, wavelength 0.9%, dope 0.9%, pump 0.9%, high 0.9%, intens 0.9%, implant 0.8%, sampl 0.8%, emiss 0.8%, anneal 0.7%, light 0.7%, energi 0.7%, power 0.6%, waveguid 0.6%, pressur 0.5%, state 0.5%, effici 0.5%, irradi 0.5%

32 (Size: 264, ISim: 2.39e-002, XSim: 9.13e-003, Gain: +0.00e+000)

laser 8.6%, optic 6.5%, beam 6.1%, mode 3.6%, frequenc 2.9%, puls 2.3%, pump 2.2%, wavelength 1.5%, power 1.5%, waveguid 0.9%, switch 0.8%, harmon 0.8%, shift 0.7%, effici 0.7%, propag 0.7%, measur 0.6%, light 0.6%, nonlinear 0.6%, theoret 0.6%, phase 0.5%, output 0.5%, field 0.5%, photon 0.5%, signal 0.5%, period 0.5%, wave 0.5%, radiat 0.4%, intens 0.4%, diod 0.4%

40 (Size: 363, ISim: 1.90e-002, XSim: 9.13e-003, Gain: -8.62e+000)

temperatur 7.8%, crystal 6.0%, ion 2.7%, dope 1.9%, electron 1.9%, implant 1.7%, anneal 1.7%, sampl 1.3%, laser 1.2%, emiss 1.1%, irradi 1.0%, pressur 1.0%, measur 0.9%, phase 0.9%, high 0.9%, glass 0.8%, increas 0.8%, layer 0.8%, intens 0.8%, energi 0.8%, transit 0.7%, state 0.7%, grown 0.7%, linbo3 0.6%, spectra 0.6%, ion.implant 0.6%, conduct 0.6%, peak 0.5%, rang 0.5%

4 (Size: 76, ISim: 5.25e-002, XSim: 1.14e-002, Gain: +0.00e+000)

implant 14.3%, ion 12.1%, ion.implant 4.8%, diamond 3.5%, anneal 3.2%, irradi 1.7%, gan 1.7%, film 1.6%, dose 1.5%, layer 1.5%, waveguid 1.2%, deposit 1.0%, substrat 0.9%, surfac 0.9%, fluenc 0.8%, nucleat 0.7%, inp 0.5%, sampl 0.5%, laser 0.5%, profil 0.5%, temperatur 0.5%, electron 0.4%, energi 0.4%, diffus 0.4%, epitaxi 0.4%, electron.energi 0.4%, energi.loss 0.3%, electron.energi.loss 0.3%, diamond.film 0.3%

36 (Size: 287, ISim: 2.06e-002, XSim: 1.14e-002, Gain: +0.00e+000)

temperatur 9.6%, crystal 8.1%, dope 2.5%, electron 1.9%, emiss 1.3%, pressur 1.3%, sampl 1.2%, phase 1.1%, measur 1.0%, laser 1.0%, glass 1.0%, high 0.9%, transit 0.9%, state 0.9%, linbo3 0.9%, intens 0.9%, increas 0.8%, conduct 0.8%, spectra 0.8%, anneal 0.7%, excit 0.7%, energi 0.7%, thermal 0.7%, grown 0.6%, peak 0.6%, absorpt 0.5%, rang 0.5%, materi 0.5%, oxygen 0.4%

6 (Size: 198, ISim: 4.46e-002, XSim: 8.93e-003, Gain: +0.00e+000)

ceram 14.7%, dielectr 13.8%, ferroelectr 5.7%, sinter 4.3%, phase 3.0%, temperatur 2.8%, dielectr.constant 1.7%, piezoelectr 1.5%, dielectr.properti 1.3%, properti 1.2%, constant 1.0%, phase.transit 1.0%, domain 1.0%, electr 0.9%, materi 0.8%, relaxor 0.8%, transit 0.8%, composit 0.7%, pmn 0.6%, polar 0.6%, pbtio3 0.5%, dope 0.5%, structur 0.5%, pyrochlor 0.5%, field 0.5%, 3nb2 0.4%, tetragon 0.4%, batio3 0.4%, increas 0.4%

64 (Size: 839, ISim: 1.54e-002, XSim: 7.86e-003, Gain: -1.82e+001)

alloi 5.4%, composit 2.6%, particl 2.0%, powder 1.8%, coat 1.6%, temperatur 1.4%, surfac 1.4%, phase 1.2%, materi 1.2%, size 1.2%, electron 1.2%, microstructur 1.2%, strength 1.0%, grain 1.0%, mechan 1.0%, increas 0.9%, properti 0.8%, nanowir 0.8%, oxid 0.8%, microscopi 0.8%, process 0.8%, structur 0.8%, electron.microscopi 0.7%, high 0.7%, corros 0.7%, sic 0.7%, blend 0.6%, crystal 0.6%, carbon 0.6%

56 (Size: 435, ISim: 2.25e-002, XSim: 9.47e-003, Gain: -1.25e+001)

alloi 13.2%, composit 3.9%, microstructur 2.4%, coat 2.3%, strength 2.3%, grain 2.1%, corros 1.7%, sic 1.5%, crack 1.2%, steel 1.2%, temperatur 1.1%, phase 1.1%, mechan 1.0%, increas 1.0%, properti 0.9%, stress 0.9%, materi 0.9%, melt 0.8%, deform 0.8%, mechan.properti 0.8%, fractur 0.8%, matrix 0.8%, disloc 0.7%, process 0.7%, tensil 0.7%, al2o3 0.6%, degreesc 0.6%, surfac 0.6%, resist 0.6%

27 (Size: 219, ISim: 2.77e-002, XSim: 1.29e-002, Gain: +0.00e+000)

composit 9.7%, coat 5.2%, sic 4.7%, strength 4.0%, crack 2.3%, al2o3 1.9%, fractur 1.7%, fiber 1.5%, materi 1.3%, interfac 1.3%, properti 1.2%, tough 1.2%, mechan.properti 1.2%, matrix 1.1%, mechan 1.0%, reinforc 0.9%, layer 0.9%, sinter 0.9%, ceram 0.8%, microstructur 0.8%, tensil 0.7%, mpa 0.7%, tic 0.6%, stress 0.6%, grain 0.6%, particl 0.6%, lamin 0.6%, surfac 0.5%, temperatur 0.5%

19 (Size: 216, ISim: 3.65e-002, XSim: 1.29e-002, Gain: +0.00e+000)

alloi 31.1%, microstructur 2.8%, grain 2.6%, corros 2.1%, steel 1.9%, deform 1.8%, disloc 1.4%, melt 1.2%, phase 1.1%, temperatur 1.1%, tial 1.0%, precipit 1.0%, increas 0.9%, strain 0.7%, stress 0.6%, heat 0.6%, degreesc 0.6%, boundari

0.6%, martensit 0.6%, gamma 0.6%, alpha 0.6%, eutect 0.6%, hydrogen 0.6%, cast 0.6%, ag 0.5%, mechan 0.5%, grain.boundari 0.5%, resist 0.5%, process 0.5%

52 (Size: 404, ISim: 2.00e-002, XSim: 9.47e-003, Gain: -1.11e+001)

powder 3.6%, particl 3.5%, nanowir 2.8%, electron 2.3%, size 1.7%, nanotub 1.7%, blend 1.7%, microscopi 1.6%, surfac 1.6%, electron.microscopi 1.5%, nanoparticl 1.3%, diffract 1.1%, diamet 1.1%, crystal 1.1%, transmiss.electron 1.1%, tio2 1.0%, coal 1.0%, structur 0.9%, temperatur 0.9%, rai 0.9%, carbon 0.9%, nano 0.9%, materi 0.9%, transmiss 0.9%, transmiss.electron.microscopi 0.8%, tem 0.8%, phase 0.7%, oxid 0.7%, growth 0.7%

35 (Size: 247, ISim: 2.22e-002, XSim: 1.18e-002, Gain: +0.00e+000)

particl 6.3%, powder 6.1%, blend 3.9%, surfac 2.5%, size 2.4%, tio2 2.1%, coal 2.0%, nano 1.7%, materi 1.3%, temperatur 1.1%, calcin 1.1%, phase 1.0%, particl.size 0.9%, zro2 0.9%, crystal 0.9%, xrd 0.8%, nanocomposit 0.7%, morpholog 0.7%, nanoparticl 0.7%, crystallin 0.7%, structur 0.7%, thermal 0.7%, coat 0.6%, nanomet 0.6%, composit 0.6%, content 0.6%, increas 0.6%, dispers 0.6%, zn 0.6%

14 (Size: 157, ISim: 4.00e-002, XSim: 1.18e-002, Gain: +0.00e+000)

nanowir 9.2%, nanotub 5.0%, electron 4.5%, microscopi 3.5%, electron.microscopi 3.4%, transmiss.electron 2.6%, transmiss.electron.microscopi 2.3%, diamet 2.3%, nanorod 2.2%, transmiss 2.1%, carbon.nanotub 2.0%, diffract 1.8%, carbon 1.7%, cnt 1.4%, growth 1.3%, rai 1.2%, nanoparticl 1.1%, tem 0.8%, electron.diffract 0.8%, nanocryst 0.8%, crystal 0.6%, structur 0.6%, templat 0.6%, nanostructur 0.5%, rai.diffract 0.5%, oxid 0.5%, arrai 0.5%, microscopi.tem 0.4%, electron.microscopi.tem 0.4%

7 (Size: 362, ISim: 4.47e-002, XSim: 1.01e-002, Gain: +0.00e+000)

film 47.5%, thin.film 4.8%, thin 4.6%, deposit 2.6%, substrat 2.1%, anneal 0.9%, pzt 0.8%, surfac 0.7%, thick 0.7%, layer 0.6%, sputter 0.6%, temperatur 0.5%, structur 0.4%, properti 0.4%, rai 0.4%, composit 0.4%, ferroelectr 0.3%, increas 0.3%, grain 0.3%, orient 0.3%, film.deposit 0.3%, polar 0.3%, electron 0.2%, sol 0.2%, dope 0.2%, stress 0.2%, tio2 0.2%, coat 0.2%, spectroscopi 0.2%

72 (Size: 1499, ISim: 1.19e-002, XSim: 5.76e-003, Gain: -3.03e+001)

reaction 4.4%, catalyst 3.4%, complex 2.8%, acid 2.7%, beta 2.0%, compound 1.8%, angstrom 1.7%, water 1.2%, structur 1.1%, crystal 1.1%, activ 1.0%, synthes 1.0%, mol 0.9%, oxid 0.8%, group 0.8%, electrod 0.8%, adsorpt 0.8%, atom 0.7%, solut 0.7%, ligand 0.7%, polymer 0.7%, hydrogen 0.7%, ion 0.7%, h2o 0.7%, polym 0.6%, catalyt 0.6%, yield 0.6%, solvent 0.6%, concentr 0.6%

68 (Size: 1173, ISim: 1.22e-002, XSim: 7.55e-003, Gain: -2.17e+001)

reaction 5.4%, catalyst 5.3%, acid 3.5%, beta 1.7%, activ 1.5%, water 1.3%, electrod 1.3%, adsorpt 1.2%, mol 1.2%, oxid 1.2%, polymer 1.0%, compound 1.0%, catalyt 0.9%, solut 0.9%, yield 0.9%, concentr 0.8%, solvent 0.8%, carbon 0.7%, synthes 0.7%, surfac 0.7%, select 0.6%, method 0.6%, temperatur 0.6%, polym 0.6%, extract 0.6%, determin 0.6%, methyl 0.5%, phase 0.5%, product 0.5%

61 (Size: 665, ISim: 1.45e-002, XSim: 7.88e-003, Gain: -1.48e+001)

acid 4.5%, electrod 3.1%, water 2.6%, adsorpt 2.3%, mol 1.9%, solut 1.6%, concentr 1.6%, determin 1.4%, extract 1.3%, polymer 1.1%, ion 0.9%, surfac 0.9%, polym 0.9%, detect 0.9%, solvent 0.8%, reaction 0.8%, method 0.8%, membran 0.7%, modifi 0.7%, rang 0.7%, phase 0.7%, copolym 0.6%, sampl 0.6%, chitosan 0.6%, poli 0.6%, separ 0.6%, aqueou 0.6%, molecular 0.5%, electrochem 0.5%

25 (Size: 245, ISim: 2.83e-002, XSim: 8.92e-003, Gain: +0.00e+000)

electrod 11.5%, mol 4.9%, determin 4.3%, detect 2.6%, electrochem 1.7%, acid 1.6%, detect.limit 1.5%, dna 1.5%, ion 1.4%, method.determin 1.2%, sampl 1.2%, rang 1.1%, modifi 1.0%, limit 1.0%, method 1.0%, solut 0.9%, sensor 0.9%, concentr 0.8%, oxid 0.8%, surfac 0.7%, linear 0.7%, reaction 0.7%, potenti 0.6%, sensit 0.6%, voltammetri 0.6%, immobil 0.5%, peak 0.5%, fluoresc 0.5%, cyclic 0.4%

49 (Size: 420, ISim: 1.63e-002, XSim: 8.92e-003, Gain: -1.05e+001)

acid 4.8%, water 3.7%, adsorpt 3.4%, polymer 2.2%, extract 1.9%, solvent 1.5%, polym 1.5%, concentr 1.4%, solut 1.3%, copolym 1.3%, chitosan 1.1%, membran 1.1%, molecular 1.0%, graft 1.0%, poli 0.9%, molecular.weight 0.9%, phase 0.9%, surfact 0.9%, weight 0.9%, aqueou 0.7%, monom 0.7%, micel 0.7%, increas 0.6%, temperatur 0.6%, surfac 0.6%, separ 0.6%, organ 0.5%, aggreg 0.5%, methyl 0.5%

39 (Size: 259, ISim: 1.88e-002, XSim: 9.55e-003, Gain: +0.00e+000)

acid 6.9%, adsorpt 6.5%, water 4.9%, extract 4.1%, membran 1.5%, phase 1.3%, surfact 1.3%, solvent 1.3%, solut 1.2%, concentr 1.1%, aqueou 1.0%, carbon 1.0%, separ 1.0%, liquid 0.8%, salt 0.8%, organ 0.8%, surfac 0.6%, mixtur 0.6%, adsorb 0.6%, capac 0.5%, pore 0.5%, resin 0.5%, oil 0.5%, equilibrium 0.5%, amino.acid 0.5%, amino 0.4%, temperatur 0.4%, ion 0.4%, column 0.4%

21 (Size: 161, ISim: 3.15e-002, XSim: 9.55e-003, Gain: +0.00e+000)

polymer 7.1%, copolym 4.4%, polym 4.3%, chitosan 3.9%, graft 3.4%, poli 2.9%, molecular.weight 2.7%, monom 2.4%, molecular 2.3%, weight 2.0%, micel 1.5%, hydrogel 1.0%, radic 1.0%, methyl 1.0%, concentr 0.9%, aggreg 0.9%,

methacryl 0.9%, crosslink 0.8%, solvent 0.8%, water 0.8%, initi 0.7%, solut 0.7%, acid 0.7%, increas 0.6%, group 0.5%, reaction 0.5%, chain 0.5%, temperatur 0.5%, acryl 0.5%

62 (Size: 508, ISim: 1.97e-002, XSim: 7.88e-003, Gain: -1.60e+001)

catalyst 16.7%, reaction 10.4%, beta 4.7%, activ 2.6%, catalyt 2.3%, yield 2.0%, compound 1.8%, oxid 1.4%, acid 1.1%, alpha 1.0%, synthes 0.9%, select 0.9%, product 0.8%, synthesi 0.8%, hydrogen 0.7%, carbon 0.6%, nmr 0.6%, temperatur 0.5%, aryl 0.5%, methyl 0.5%, support 0.5%, high 0.5%, structur 0.5%, catalyt.activ 0.5%, al2o3 0.4%, complex 0.4%, polymer 0.4%, convers 0.4%, cyclodextrin 0.4%

3 (Size: 181, ISim: 5.20e-002, XSim: 1.07e-002, Gain: +0.00e+000)

catalyst 43.7%, catalyt 4.7%, activ 4.2%, oxid 1.8%, reaction 1.8%, select 1.4%, catalyt.activ 1.3%, al2o3 1.1%, polymer 1.0%, hydrogen 0.9%, support 0.8%, convers 0.8%, sio2 0.5%, temperatur 0.4%, carbon 0.4%, sulfur 0.4%, ethylen 0.4%, acid 0.4%, gamma.al2o3 0.4%, complex 0.4%, surfac 0.4%, reduct 0.4%, yield 0.3%, high 0.3%, zeolit 0.3%, oxygen 0.3%, tpr 0.3%, promot 0.3%, speci 0.3%

55 (Size: 327, ISim: 1.99e-002, XSim: 1.07e-002, Gain: -1.22e+001)

reaction 14.4%, beta 10.4%, compound 3.7%, yield 2.8%, alpha 2.0%, synthes 1.6%, aryl 1.1%, nmr 1.1%, acid 1.1%, cyclodextrin 1.0%, product 1.0%, synthesi 0.9%, methyl 0.7%, deriv 0.6%, beta.cyclodextrin 0.6%, isol 0.6%, new 0.6%, elucid 0.5%, structur 0.5%, aldehyd 0.5%, alcohol 0.5%, chiral 0.5%, coupl 0.5%, activ 0.5%, good 0.5%, substitut 0.4%, glucopyranosyl 0.4%, good.yield 0.4%, beta.glucopyranosyl 0.4%

29 (Size: 196, ISim: 2.62e-002, XSim: 8.09e-003, Gain: +0.00e+000)

reaction 26.9%, yield 4.8%, product 1.5%, synthes 1.3%, synthesi 1.1%, aldehyd 1.0%, aryl 0.9%, coupl 0.9%, alcohol 0.8%, chiral 0.7%, acid 0.7%, good.yield 0.7%, good 0.7%, catalyz 0.7%, solvent 0.6%, condit 0.6%, allyl 0.6%, reaction.mechan 0.6%, radic 0.5%, mechan 0.5%, high 0.5%, carbon 0.5%, temperatur 0.5%, rate 0.5%, energi 0.5%, reagent 0.4%, alkyl 0.4%, compound 0.4%, methyl 0.4%

10 (Size: 131, ISim: 4.11e-002, XSim: 8.09e-003, Gain: +0.00e+000)

beta 27.8%, compound 6.6%, alpha 3.8%, cyclodextrin 2.9%, nmr 2.8%, beta.cyclodextrin 1.8%, isol 1.7%, elucid 1.5%, glucopyranosyl 1.3%, beta.glucopyranosyl 1.2%, structur.elucid 1.2%, structur 1.2%, inclus 1.0%, spectroscop 0.9%, new 0.9%, synthes 0.7%, acid 0.6%, glucopyranosid 0.6%, inclus.complex 0.6%, new.compound 0.5%, alpha.beta 0.5%, glycosid 0.5%, methyl

0.5%, aryl 0.4%, deriv 0.4%, two.new 0.4%, 3beta 0.4%, alpha.beta.unsatur 0.4%, unsatur 0.4%

48 (Size: 326, ISim: 3.86e-002, XSim: 7.55e-003, Gain: -1.03e+001)

angstrom 10.8%, complex 8.6%, crystal 4.3%, ligand 3.4%, atom 2.9%, coordin 2.6%, h2o 2.1%, structur 2.1%, degre 2.0%, compound 1.9%, group 1.6%, titl 1.5%, space.group 1.5%, bond 1.5%, rai 1.0%, titl.compound 1.0%, crystal.structur 1.0%, hydrogen.bond 0.9%, beta 0.9%, molecul 0.9%, space 0.9%, two 0.8%, synthes 0.8%, monoclin 0.7%, hydrogen 0.7%, bridg 0.7%, dimension 0.6%, diffract 0.6%, phen 0.5%

0 (Size: 154, ISim: 7.26e-002, XSim: 2.45e-002, Gain: +0.00e+000)

angstrom 23.9%, crystal 4.8%, degre 4.4%, space.group 3.1%, titl 2.8%, compound 2.8%, atom 2.7%, titl.compound 2.1%, group 1.8%, beta 1.8%, space 1.7%, monoclin 1.4%, structur 1.2%, complex 1.1%, bond 0.9%, crystal.structur 0.9%, h2o 0.9%, molecul 0.8%, rai 0.8%, coordin 0.7%, angstrom.beta 0.7%, ring 0.7%, ligand 0.6%, diffract 0.6%, hydrogen.bond 0.6%, 000 0.6%, unit 0.6%, two 0.5%, rai.diffract 0.5%

17 (Size: 172, ISim: 3.65e-002, XSim: 2.45e-002, Gain: +0.00e+000)

complex 19.3%, ligand 6.8%, coordin 4.1%, h2o 2.7%, structur 1.9%, crystal 1.6%, atom 1.5%, bond 1.3%, bridg 1.3%, spectra 1.2%, synthes 1.1%, copper 1.0%, ion 1.0%, hydrogen.bond 0.9%, iii 0.9%, clo4 0.9%, eta 0.8%, rai 0.8%, dimension 0.7%, two 0.7%, hydrogen 0.7%, interact 0.7%, element 0.6%, phen 0.6%, fluoresc 0.6%, bi 0.6%, group 0.6%, carboxyl 0.6%, crystal.structur 0.5%

Appendix 10B - Cluto Taxonomy
-Science Citation Index
-40 Clusters
2002 Database

The taxonomy of this SCI 2002 data set was derived from the data shown in Appendix 10A (Cluto 40-cluster run). Figure A10B-1 (also Figure 4 of the Text) below, shows the top level taxonomy of levels 1-4. In the figure below, the numbers in parentheses represent the number of records (abstracts) associated with that particular cell. The number in brackets represents the percentage of the number of records of the particular cell to the overall number of records (7780 possible).

Figure A10B-1. Partitional Document Clustering (CLUTO) Taxonomy Levels 1-4 (SCI, 40 Clusters, year 2002)

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
(1711) - Bio-Medical Sciences [22%]	(865) - Laboratory Medical Research [11.1%]	(501) - Animal & Human Physiology [6.4%]	(217) - Animal Physiology [2.8%]
			(284) - Human Physiology [3.7%]
		(364) - Genetic & Molecular Biology [4.7%]	(165) - Molecular Biology [2.1%]
			(199) - Genetics [2.6%]
	(846) - Clinical Medicine [10.9%]	(389) - Clinical Medicine [5.0%]	(210) - Clinical Chronic Disease Treatment [2.7%]
			(179) - Cancer Risk Factors [2.3%]
		(457) - Geology & Environmental Sciences [5.9%]	(210) - Geology of Chinese Regions [2.7%]
			(247) - Seasonal & climate induced changes on environment [3.2%]
(6069) - Physical & Engineering Sciences [78%]	(2544) - Physics, Mechanics & Mathematics [32.7%]	(1180) - Algorithms & Mathematics [15.2%]	(713) - Algorithms of control systems, models, & networks [9.2%]
			(467) - Mathematics [6.0%]
		(1364) - Physics & Mechanics [17.5%]	(737) - Mechanics & Magnetics [9.5%]
			(627) - Physics [8.1%]
	(3525) - Chemistry & Materials Science [45.3%]	(2026) - Materials Science [26%]	(1664) - Physics of Materials & Nanomaterials [21.4%]
			(362) - Physical properties of thin films & substrates [4.7%]
		(1499) - Chemistry [19.3%]	(1173) - Chemistry of Organic & Inorganic Materials [15.1%]
			(326) - Chemistry of Crystals [4.2%]

Figure A10B-2. Partitional Document Clustering (CLUTO) Taxonomy All Levels (SCI, 40 Clusters, year 2002)
BLANK – CLUTO SCI-40

CLU'

CLUTO (SCI-40 CLUSTERS)

THE STRUCTURE OF CHINA - STERS (ColModel & RowModel = Defaults), 7780 Records (year 2002)

Orange ==> action/synthesis
Blue ==> properties/characterization/definition

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7	LEVEL 8
78 (7780)	75 (1711) - *Bio-Medical Sciences* (Laboratory & Clinical Medicine)	67 (865) - *Laboratory Medical Research* - microbiology and genetic research for cancer treatments	53 (501) - *Animal & Human Physiology* - cell expression & activity associated with human & rat cells/tumors	28 (217) - *Animal Physiology* - study of rats & mice activity of ca2 (bones?), neurons, cells, and proteins physiology				
				18 (284) - *Human Physiology* - cell physiology of human tissues, proteins, & genes for cancer/tumors				
			47 (364) - *Genetic & Molecular Biology* - gene & protein expression & sequencing for cloning of human & plant cells	13 (165) - *Molecular Biology* - proteins, and amino acids expressions/sequencing of human, fusion & recombination				
				9 (199) - *Genetics* - gene expression, & dna sequencing of plants for cloning, mutations, tumors				
		70 (846) - *Clinical Medicine* - environmental impacts on human diseases	50 (389) - *Clinical Medicine* - coorelation of patient diseases, symptoms, diagnosis, & treatments with the different categories of risk	5 (210) - *Clinical Chronic Disease Treatment* - patient diseases (arteries, tumors), symptoms, diagnosis, & treatments				
				31 (179) - *Cancer Risk Factors* - categories of risk factors for cancer (eg. Sex, age, race, disease, blood, smoking)				
			57 (457) - *Geology & Environmental Sciences* - geology of chinese regions & changes due to seasons & climate	45 (210) - *Geology of Chinese Regions*	16 (130) - chinese species & population of fungi			
					1 (80) - geology of rocks, metamorph in different regions of china due to vulcanic activity and fault lines			
				34 (247) - *Seasonal & climate induced changes on environment* - in soil, plant & vegetation, & roots in different regions of China				
	77 (6059) - *Physical & Engineering Sciences*	74 (2544) - *Physics, Mechanics & Mathematics*	69 (1180) - *Algorithms & Mathematics*	60 (713) - *Algorithms of control systems, models, & networks*	44 (348) - *Systems Design & Control*	33 (203) - system design, service, cost, modeling of process, management		
						11 (145) - control systems of chaotic behavior & dynamic feedback of power systems		
					46 (365) - *Image Processing Algorithms*	26 (210) - image processing techniques, neural networks, wavelets,reconstruction, object recognition		
						8 (155) - algorithm methods & optimization (genetic, fuzzy, network)		
				54 (467) - *Mathematics*	30 (222) - *Elements of Algebra Theorems*			
					23 (245) - *Elements of Equations* (solutions, conditions, boundaries, existance, non-linear, differential)			
			66 (1364) - *Physics & Mechanics*	63 (737) - *Mechanics & Magnetics*	43 (449) - *Fluids & Solid Mechanics*	24 (177) - *fluids & heat transfer* - *flow*, velocity, turbulence, heat		
						37 (272) - *Modeling & Simulation of Dynamics, and Structure Damage* (e.g. cracks, stress)		
					41 (288) - *Electromagnetics*	22 (184) - *Waves* - waves & magnetic field properties associated with plasmas and piezoelectrics		
						2 (104) - *Magnetics* - magnetic fields & properties associated with ferromagnets, magnetoresisters, superconductors & plasmas		
				58 (627) - *Physics*	51 (250) - *Quantum & Nuclear/Particle Physics*	12 (123) - *Quantum Physics* - physical properties of quantum physics & black holes - *MACRO OBJECTS*		
						15 (127) - *Particle (Sub-Atomic) Physics* - physical properties of state of (quarks, mesons, gamma rays, neutrons, etc) - *MICRO OBJECTS*		
					42 (377) - *Physical Properties* of energy states, orbitology, structures, and interactions	38 (233) - *Astrophysics* - orbitology & energy state calculation of stars & galaxies - *MACRO OBJECTS*		
						20 (144) - *Atomic Physics* - structures, orbitology & energy states of atoms & molecules - *MICRO OBJECTS*		
		76 (3525) - *Chemistry & Materials Science*	73 (2026) - *Materials Science*	71 (1664) - *Physics of Materials & Nanomaterials*	65 (825) - *Material Science* of ceramics, dielectrics, ferroelectrics, & piezoelectrics for use as films & substrates	59 (627) - using lasers to implant ions in films & substrates	32 (264) - laser & optics properties	
							40 (383) - temperature effects on crystals, and ion implantation in films & substrates	4 (76) - ion implantation in films & substrates
								36 (287) - temperature effects on the physical properties of crystals
						6 (198) - properties of ceramic, dielectric, ferroelectrics, and piezoelectric materials		
					64 (838) - *Nano-materials in Microstructures* (composites, coatings, fibers, and alloys)	56 (436) - properties of composite, coatings, fibers, and alloy microstructures	27 (219) - physical properties of composites, coatings, & fiber materials	
							19 (216) - properties of alloy microstructures	
						52 (404) - *Nano-materials*	35 (247) - nanoparticles, powders, blends, & nanocomposites properties	
							14 (157) - nanotubes, nanowires, nanorods, & nanocrystals - *growth of*	
				7 (362) - *Physical properties of thin films & substrates*				
			72 (1499) - *Chemistry*	68 (1173) - *Chemistry of Organic & Inorganic Materials* (microstructures outsides)	61 (665) - *Physical Chemistry of Surfaces*	25 (245) - electrode detection of dna electrochemical properties		
						49 (420) - physical chemistry on surfaces of polymers, copolymers & chitosan	39 (259) - physical chemistry properties & interactions of elements on films, resins, membranes, & crystal surfaces	
							21 (161) - physical properties of polymers, copolymers, and chitosans	
					62 (506) - *Physical Chemistry of Organic & Inorganic Materials*	3 (181) - properties of catalyst & reactions of polymers, al2o3, hydrogen, etc		
						55 (327) - physical chemistry of organic compounds & enzymes in immunology	29 (196) - reactions, synthesis, and properties of organic compounds	
							10 (131) - effects of compounds and enzymes (*used in immunology studies??*)	
				48 (326) - *Chemistry of Crystals* (microstructures insides)	0 (154) - *Physical characterization of crystal structures & compounds*			
					17 (172) - synthesis of *Complex Microstructures*			

Attachment 3 - APPENDIX A10B-2 - CLUTO TAXONOMY (SCI-40 All Levels) 1/1 Printed -- 12/22/2005 1:53 PM

Appendix 10C – Partitional Clusters

-CLUTO
-Engineering Compendex
-256-Clusters
-2000-2003 Database

This Appendix presents the CLUTO results for the Engineering Compendex 2000-2003 database. There were 256 clusters selected. The format is the same as for the forty cluster results reported in Appendix 10A. Table A10C-1 below, contains a summary of the base 256 clusters (the lowest level).

Cluster 0,
Size: 27, ISim: 0.297, ESim: 0.005
Descriptive: watermark 68.7%, imag 3.2%, digit 3.0%, embed 1.7%, robust 1.6%, digit.watermark 1.6%, imag.watermark 1.1%, watermark.imag 0.9%, wavelet 0.8%, emb 0.5%, watermark.system 0.5%, robust.watermark 0.4%, digit.imag 0.4%, wavelet.transform 0.3%, invis 0.3%
Discriminating: watermark 39.0%, sub 2.3%, system 1.3%, digit 1.1%, model 1.1%, digit.watermark 0.9%, embed 0.8%, measur 0.8%, control 0.7%, robust 0.7%, imag.watermark 0.6%, time 0.5%, watermark.imag 0.5%, sup 0.5%, structur 0.5%

Focuses on imaging watermarks (embedding & detecting).

Cluster 1,
Size: 11, ISim: 0.276, ESim: 0.003
Descriptive: flashov 16.4%, trap 13.5%, trap.distribut 8.3%, alumina 8.0%, alumina.ceram 2.6%, insul 2.6%, starch 2.6%, vacuum 1.8%, surfac.flashov 1.7%, ceram 1.6%, sinter 1.5%, alumina.insul 1.5%, tapioca 1.4%, tapioca.starch 1.4%, distribut.alumina 1.4%
Discriminating: flashov 8.9%, trap 7.0%, trap.distribut 4.5%, alumina 4.2%, sub 2.2%, system 1.6%, alumina.ceram 1.4%, starch 1.3%, insul 1.3%, model 1.0%, surfac.flashov 0.9%, vacuum 0.8%, alumina.insul 0.8%, tapioca 0.8%, tapioca.starch 0.8%

Focuses on surface flashover phenomena & trap distribution associated with alumina ceramics for insulators.

Cluster 2,
Size: 23, ISim: 0.216, ESim: 0.005
Descriptive: fluidiz 20.5%, bed 18.7%, fluidiz.bed 12.2%, separ 10.3%, coal 3.3%, medium 1.5%, jig 1.5%, dens.medium 0.9%, magnet 0.8%, dens 0.8%, densiti 0.7%, coal.separ 0.6%, air 0.6%, air.dens 0.6%, air.dens.medium 0.6%

Discriminating: fluidiz 11.8%, bed 10.4%, fluidiz.bed 7.0%, separ 4.9%, sub 2.3%, system 1.6%, coal 0.9%, jig 0.9%, measur 0.8%, algorithm 0.8%, model 0.8%, imag 0.7%, control 0.7%, medium 0.7%, paper 0.6%

Focuses on characteristics associated with fluidization studies of beds, separation, coal, mediums, jig, densities.

Cluster 3,
Size: 15, ISim: 0.213, ESim: 0.006
Descriptive: gi 35.1%, geograph 6.0%, inform 5.2%, inform.system 5.2%, geograph.inform 3.7%, geograph.inform.system 3.1%, spatial 3.0%, data 2.0%, spatial.data 1.8%, geotherm 1.5%, map 1.1%, system 1.1%, inform.system.gi 0.9%, system.gi 0.9%, gi.geograph 0.8%
Discriminating: gi 20.7%, geograph 3.6%, inform.system 2.9%, sub 2.4%, geograph.inform 2.2%, geograph.inform.system 1.9%, inform 1.7%, spatial 1.4%, spatial.data 1.0%, measur 0.9%, geotherm 0.9%, control 0.8%, algorithm 0.8%, imag 0.6%, inform.system.gi 0.5%

Focuses on GIS (Geographic Information Systems) example uses for mapping of geothermal resources.

Cluster 4,
Size: 16, ISim: 0.210, ESim: 0.004
Descriptive: nanowir 58.7%, nanowhisk 1.1%, cd 1.1%, diamet 1.1%, sic.nanowir 0.9%, nanofib 0.9%, crystallin 0.8%, synthes 0.8%, sic 0.7%, length 0.6%, nanostructur 0.6%, growth 0.6%, cd.nanowir 0.6%, tic 0.5%, reaction 0.5%
Discriminating: nanowir 33.1%, sub 2.0%, system 1.6%, model 1.1%, algorithm 0.8%, measur 0.8%, control 0.7%, paper 0.7%, nanowhisk 0.6%, imag 0.6%, cd 0.5%, sic.nanowir 0.5%, new 0.5%, nanofib 0.5%, data 0.5%

Focuses on nanowires.

Cluster 5,
Size: 17, ISim: 0.201, ESim: 0.005
Descriptive: outburst 22.8%, coal 15.8%, em 6.1%, methan 4.9%, emr 4.1%, rock 3.2%, burst 2.9%, rock.burst 2.4%, coal.ga 2.3%, fractur 2.2%, ga.outburst 2.1%, coal.ga.outburst 2.1%, ga 1.7%, methan.outburst 1.1%, coal.methan 1.1%
Discriminating: outburst 13.3%, coal 6.9%, em 3.5%, methan 2.6%, emr 2.4%, sub 2.2%, burst 1.6%, system 1.6%, rock.burst 1.4%, coal.ga 1.3%, rock 1.3%, coal.ga.outburst 1.2%, ga.outburst 1.2%, fractur 1.0%, model 0.8%

Focuses on studies predicting outbursts of rocks (coal) & gases (methane) by monitoring Electromagnetic Emissions/Radiation (EME/EMR).

Cluster 6,
Size: 15, ISim: 0.199, ESim: 0.005
Descriptive: bolt 50.9%, rock 2.7%, surround 1.7%, roadwai 1.7%, abut 1.7%, deform 1.3%, arch 1.3%, anchor 1.3%, arch.dam 1.1%, truss 1.1%, dam 1.1%, rock.bolt 0.9%, mantl 0.8%, strength 0.8%, rock.surround 0.7%
Discriminating: bolt 29.2%, sub 2.3%, system 1.6%, rock 1.0%, abut 0.9%, roadwai 0.9%, model 0.9%, surround 0.9%, algorithm 0.8%, imag 0.7%, anchor 0.7%, arch 0.7%, measur 0.7%, arch.dam 0.7%, truss 0.6%

Focuses on deformation of bolts and anchoring them to rocks & trusses (applications - mines & bridges).

Cluster 7,
Size: 132, ISim: 0.185, ESim: 0.009
Descriptive: sub 36.6%, sub.sub 31.4%, sub.sub.sub 21.9%, temperatur 0.3%, dope 0.2%, magnet 0.2%, superconduct 0.2%, sup 0.2%, crystal 0.2%, delta 0.2%, sub.delta 0.1%, sub.sub.delta 0.1%, transit 0.1%, glass 0.1%, structur 0.1%
Discriminating: sub.sub 17.9%, sub.sub.sub 14.3%, sub 13.5%, system 1.8%, model 1.3%, algorithm 0.9%, imag 0.9%, control 0.9%, measur 0.7%, paper 0.7%, time 0.6%, new 0.5%, data 0.5%, simul 0.5%, network 0.5%

Focuses on properties of compounds such as crystals and glass, such as temperature, magnetic, superconductivity and structures.

Cluster 8,
Size: 16, ISim: 0.176, ESim: 0.005
Descriptive: suppli.chain 24.4%, suppli 12.1%, chain 11.9%, scm 6.9%, enterpris 4.8%, manufactur 2.0%, decis 1.3%, cooper 0.6%, hierarchi 0.6%, share 0.6%, chain.scm 0.5%, suppli.chain.scm 0.5%, agil 0.5%, inform 0.5%, sustain 0.5%
Discriminating: suppli.chain 14.3%, suppli 6.5%, chain 6.2%, scm 4.0%, enterpris 2.3%, sub 2.2%, system 1.1%, measur 0.9%, manufactur 0.9%, algorithm 0.8%, imag 0.7%, control 0.6%, time 0.5%, decis 0.5%, sup 0.5%

Focuses on supply chain manufacturing (scm) and enterprising.

Cluster 9,
Size: 13, ISim: 0.174, ESim: 0.005
Descriptive: crystal 11.0%, nucleat 8.1%, isotact 5.4%, ipp 4.8%, pom 3.1%, crystallin 2.7%, polypropylen 1.8%, nucleat.agent 1.6%, crystal.rate 1.4%, attapulgit

1.3%, differenti.scan 1.2%, crystal.kinet 1.2%, calcium 1.0%, differenti.scan.calorimetri 1.0%, scan.calorimetri 1.0%
Discriminating: crystal 5.0%, nucleat 4.6%, isotact 3.2%, ipp 2.8%, pom 1.8%, sub 1.7%, system 1.7%, crystallin 1.4%, model 1.1%, polypropylen 1.0%, nucleat.agent 0.9%, measur 0.8%, crystal.rate 0.8%, control 0.8%, algorithm 0.8%

Focuses on characterizing the effects of nucleation on the crystalization behavior of polymer materials such as polypropylene (PP) and polyoxymethylene (POM).

Cluster 10,
Size: 23, ISim: 0.172, ESim: 0.006
Descriptive: roof 22.4%, coal 9.1%, cave 7.4%, top.coal 7.1%, support 6.2%, top 4.2%, mine 3.3%, coal.cave 2.4%, top.coal.cave 2.2%, rock 1.7%, face 1.5%, support.resist 1.3%, deform 1.1%, strata 0.8%, broken 0.8%
Discriminating: roof 13.6%, cave 4.4%, top.coal 4.3%, coal 3.8%, support 3.0%, top 2.4%, sub 2.3%, system 1.6%, coal.cave 1.5%, top.coal.cave 1.3%, mine 1.2%, algorithm 0.8%, support.resist 0.8%, face 0.7%, imag 0.7%

Focuses on support of roofs in mines (coal) and caves.

Cluster 11,
Size: 31, ISim: 0.167, ESim: 0.005
Descriptive: posit.solut 24.4%, posit 10.0%, solut 9.2%, exist 5.7%, boundari 3.3%, suffici 2.4%, suffici.condit 2.0%, condit 1.8%, multipl.posit.solut 1.5%, multipl.posit 1.5%, theorem 1.4%, exist.posit.solut 1.4%, nonlinear 1.2%, exist.posit 1.1%, fix.point 1.0%
Discriminating: posit.solut 14.3%, posit 4.5%, solut 2.9%, exist 2.6%, sub 2.1%, system 1.4%, boundari 1.3%, model 1.1%, suffici 1.1%, suffici.condit 0.9%, multipl.posit.solut 0.9%, multipl.posit 0.9%, measur 0.9%, exist.posit.solut 0.8%, control 0.8%

Focuses on solutions related to position, such as existence, boundaries, and nonlinear solutions.

Cluster 12,
Size: 23, ISim: 0.167, ESim: 0.005
Descriptive: nanotub 29.4%, carbon 20.5%, carbon.nanotub 13.4%, cnt 1.3%, mwnt 1.1%, wall.carbon.nanotub 1.0%, wall.carbon 1.0%, electron 0.9%, wall 0.6%, singl.wall 0.5%, singl.wall.carbon 0.5%, nanotub.cnt 0.5%, carbon.nanotub.cnt 0.5%, methan 0.5%, nanotub.electron 0.5%
Discriminating: nanotub 17.2%, carbon 11.0%, carbon.nanotub 7.9%, system 1.7%, sub 1.6%, model 1.2%, algorithm 0.8%, cnt 0.8%, measur 0.7%, imag 0.6%, paper 0.6%, mwnt 0.6%, wall.carbon.nanotub 0.6%, wall.carbon 0.6%, control 0.5%

Focuses on carbon nanotubes.

Cluster 13,
Size: 26, ISim: 0.165, ESim: 0.006
Descriptive: ann 20.3%, artifici.neural.network 10.7%, artifici.neural 10.5%, artifici 8.3%, neural 5.9%, neural.network 5.8%, network 4.5%, network.ann 3.8%, neural.network.ann 3.8%, model 1.0%, weight 0.6%, ann.model 0.5%, dfa 0.4%, applic.artifici.neural 0.4%, synaps 0.3%
Discriminating: ann 12.4%, artifici.neural.network 6.5%, artifici.neural 6.4%, artifici 4.8%, neural.network 2.7%, neural 2.6%, sub 2.5%, network.ann 2.3%, neural.network.ann 2.3%, network 1.1%, system 1.0%, imag 0.8%, measur 0.6%, sup 0.5%, solut 0.5%

Focuses on artificial neural networks (ANN).

Cluster 14,
Size: 15, ISim: 0.163, ESim: 0.004
Descriptive: gear 35.4%, tooth 10.1%, contact 6.1%, worm 3.1%, involut 2.9%, toroid 2.0%, reliabl.design 1.0%, load 0.9%, basi.set 0.8%, forc 0.7%, proton 0.7%, spheric 0.6%, gear.tooth 0.5%, wheel 0.5%, contact.forc 0.5%
Discriminating: gear 19.9%, tooth 5.8%, contact 3.2%, sub 2.3%, worm 1.8%, system 1.7%, involut 1.6%, toroid 1.1%, model 0.8%, control 0.8%, algorithm 0.8%, imag 0.7%, measur 0.7%, reliabl.design 0.6%, time 0.5%

Focuses on loading on gears and gear teeth.

Cluster 15,
Size: 22, ISim: 0.162, ESim: 0.005
Descriptive: flame 13.4%, retard 12.7%, flame.retard 10.6%, thermal.degrad 2.0%, thermal 1.9%, degrad 1.8%, loi 1.8%, oxygen 1.8%, phosphoru 1.7%, blend 1.6%, char 1.4%, oxygen.index 1.1%, polyethylen 1.0%, hffr 0.9%, coal 0.9%
Discriminating: flame 7.7%, retard 7.4%, flame.retard 6.3%, sub 2.1%, system 1.7%, thermal.degrad 1.2%, model 1.1%, loi 1.0%, phosphoru 1.0%, degrad 0.9%, char 0.8%, control 0.8%, algorithm 0.8%, imag 0.7%, oxygen 0.7%

Focuses on characterizing flame retardants and thermal degradation.

Cluster 16,
Size: 20, ISim: 0.164, ESim: 0.007

<u>*Descriptive:*</u> sub 12.7%, magnet 9.5%, mno.sub 4.2%, sub.sub 4.1%, mno 4.1%, sub.sub.mno 3.9%, sub.mno 3.9%, sub.mno.sub 3.9%, stiffen 2.5%, charg.order 2.3%, temperatur 1.8%, sound.veloc 1.4%, magnet.field 1.2%, phase 1.0%, teller 0.8%
<u>*Discriminating:*</u> magnet 4.8%, mno.sub 2.7%, mno 2.6%, sub.sub.mno 2.5%, sub.mno.sub 2.5%, sub.mno 2.5%, sub 1.7%, system 1.7%, stiffen 1.6%, charg.order 1.5%, model 1.3%, sub.sub 1.0%, sound.veloc 0.9%, control 0.9%, algorithm 0.9%

Focuses on phenomena (non-mechanical) such as magnetic fields that cause changes in properties of materials (e.g. MnO).

Cluster 17,
Size: 20, ISim: 0.160, ESim: 0.004
<u>*Descriptive:*</u> dye 44.7%, adsorpt 12.4%, adsorb 3.2%, tea 2.5%, desorpt 1.4%, dye.dye 0.9%, sup 0.9%, polyest 0.9%, cyanin 0.7%, cyanin.dye 0.7%, laser 0.6%, rate 0.5%, properti 0.5%, adsorpt.rate 0.5%, rhenium 0.4%
<u>*Discriminating:*</u> dye 25.7%, adsorpt 6.7%, adsorb 1.8%, system 1.7%, sub 1.6%, tea 1.4%, model 1.1%, control 0.8%, algorithm 0.8%, desorpt 0.7%, imag 0.7%, measur 0.7%, paper 0.6%, dye.dye 0.5%, polyest 0.5%

Focuses on the adsorption, adsorbtion, and desorption properties of dyes and tea.

Cluster 18,
Size: 29, ISim: 0.161, ESim: 0.005
<u>*Descriptive:*</u> molecular.weight 10.7%, polymer 9.0%, molecular 6.6%, weight 6.2%, copolym 2.4%, molecular.weight.distribut 2.1%, weight.distribut 2.1%, initi 1.9%, pthf 1.9%, poli 1.5%, nmr 1.4%, acryl 1.2%, ring.open 1.1%, methyl 1.0%, narrow 1.0%
<u>*Discriminating:*</u> molecular.weight 6.2%, polymer 4.6%, molecular 3.4%, weight 3.0%, system 1.7%, molecular.weight.distribut 1.3%, sub 1.2%, weight.distribut 1.2%, model 1.2%, copolym 1.1%, pthf 1.1%, measur 0.8%, algorithm 0.8%, imag 0.7%, initi 0.7%

Focuses on the primary properties used to characterize copolymers such as molecular weight distribution.

Cluster 19,
Size: 23, ISim: 0.160, ESim: 0.007
<u>*Descriptive:*</u> rbf 20.9%, network 11.1%, neural 5.5%, basi.function 4.9%, radial.basi 4.5%, rbf.network 4.3%, radial.basi.function 3.6%, radial 2.6%, neural.network 2.5%, train 1.8%, basi.function.neural 1.8%, basi 1.6%, function.neural 1.5%, function 1.2%, learn 1.1%
<u>*Discriminating:*</u> rbf 13.3%, network 4.1%, basi.function 3.1%, radial.basi 2.9%, rbf.network 2.7%, sub 2.5%, neural 2.5%, radial.basi.function 2.3%, radial 1.5%,

system 1.3%, basi.function.neural 1.1%, neural.network 1.0%, measur 1.0%, function.neural 0.9%, train 0.8%

Focuses on radial basis function (rbf) and neural networks.

Cluster 20,
Size: 21, ISim: 0.158, ESim: 0.006
Descriptive: wavelet.packet 20.1%, packet 18.0%, wavelet 12.9%, signal 2.6%, fault 2.3%, wavelet.packet.transform 2.1%, packet.transform 2.0%, vibrat.signal 1.3%, denois 1.0%, decomposit 0.8%, transform 0.8%, wpt 0.8%, featur.vector 0.8%, rotor 0.8%, extract 0.7%
Discriminating: wavelet.packet 12.4%, packet 10.8%, wavelet 5.8%, sub 2.4%, system 1.4%, wavelet.packet.transform 1.3%, packet.transform 1.3%, model 1.1%, measur 0.9%, fault 0.8%, control 0.8%, vibrat.signal 0.8%, imag 0.6%, denois 0.5%, signal 0.5%

Focuses on wavelet packet transform.

Cluster 21,
Size: 34, ISim: 0.147, ESim: 0.004
Descriptive: nanocomposit 24.5%, intercal 11.2%, clai 4.7%, mmt 3.5%, graphit 2.5%, montmorillonit 2.2%, rai 1.3%, graphit.oxid 1.1%, rai.diffract 1.1%, clai.nanocomposit 1.1%, diffract 0.9%, mmt.nanocomposit 0.9%, thermal 0.8%, intercal.graphit 0.7%, exfoli 0.6%
Discriminating: nanocomposit 13.8%, intercal 6.4%, clai 2.6%, sub 2.2%, mmt 2.0%, system 1.7%, graphit 1.3%, montmorillonit 1.2%, model 1.1%, measur 0.8%, control 0.8%, algorithm 0.8%, paper 0.7%, graphit.oxid 0.6%, clai.nanocomposit 0.6%

Focuses on studies of types of nanocomposites such as clay, Montmorillonite [MMT], and graphite oxides.

Cluster 22,
Size: 30, ISim: 0.146, ESim: 0.006
Descriptive: sar 26.5%, imag 11.4%, sar.imag 11.0%, speckl 6.4%, wavelet 2.7%, filter 2.7%, apertur.radar 1.8%, radar 1.4%, apertur 1.3%, edg 0.9%, polarimetr 0.7%, azimuth 0.7%, radar.imag 0.6%, transform 0.5%, radar.sar.imag 0.5%
Discriminating: sar 16.6%, sar.imag 7.0%, speckl 3.9%, imag 3.3%, sub 2.5%, system 1.9%, model 1.1%, apertur.radar 1.1%, measur 1.0%, filter 0.9%, control 0.9%, wavelet 0.8%, apertur 0.7%, radar 0.7%, sup 0.5%

Focuses on synthetic aperature radar (SAR) imaging.

Cluster 23,
Size: 15, ISim: 0.143, ESim: 0.004
Descriptive: signatur 24.5%, scheme 16.1%, signatur.scheme 7.4%, blind.signatur 3.8%, blind.signatur.scheme 3.1%, blind 2.1%, fan.lei 1.2%, lei 1.2%, proxi 1.1%, distanc 1.0%, phylogeni 1.0%, scheme.effici 1.0%, target 1.0%, attack 0.8%, new 0.7%
Discriminating: signatur 13.9%, scheme 7.1%, signatur.scheme 4.2%, sub 2.3%, blind.signatur 2.2%, blind.signatur.scheme 1.8%, system 1.5%, model 1.1%, blind 1.1%, measur 0.8%, control 0.8%, imag 0.7%, fan.lei 0.7%, lei 0.7%, proxi 0.6%

Focuses on blind signature schemes in cryptographic communications.

Cluster 24,
Size: 19, ISim: 0.141, ESim: 0.005
Descriptive: transform 14.1%, detect 3.9%, transform.edg.detect 3.4%, edg 3.3%, wavelet.transform.edg 3.3%, transform.edg 3.2%, current 3.1%, fault 2.5%, edg.detect 2.0%, wavelet 1.9%, current.transform 1.7%, wavelet.transform 1.7%, new.wavelet.transform 1.1%, satur 1.1%, satur.current 1.0%
Discriminating: transform 6.2%, sub 2.4%, transform.edg.detect 2.1%, wavelet.transform.edg 2.0%, transform.edg 1.9%, system 1.6%, edg 1.5%, detect 1.2%, model 1.2%, edg.detect 1.2%, current 1.1%, current.transform 1.0%, fault 0.9%, control 0.8%, measur 0.7%

Focuses on wavelet transforms applied tp edge detection.

Cluster 25,
Size: 23, ISim: 0.139, ESim: 0.003
Descriptive: deink 42.1%, pulp 4.1%, deink.pulp 2.8%, onp 1.9%, ink 1.8%, treatment 1.5%, bright 1.3%, pac 1.3%, wastewat 1.1%, sludg 1.0%, decolor 0.8%, bleach 0.8%, deink.agent 0.7%, uptak 0.7%, deink.condit 0.6%
Discriminating: deink 23.3%, sub 1.9%, pulp 1.8%, system 1.5%, deink.pulp 1.5%, model 1.1%, onp 1.0%, ink 1.0%, measur 0.8%, algorithm 0.8%, imag 0.7%, pac 0.7%, bright 0.7%, control 0.6%, wastewat 0.6%

Focuses on deinking of pulp and newsprint applied to papermaking process (the process of deconvolving discrete states).

Cluster 26,
Size: 29, ISim: 0.139, ESim: 0.005
Descriptive: differenti.equat 11.6%, differenti 11.2%, equat 8.9%, impuls 7.4%, oscil 4.9%, oscillatori 2.7%, second.order 2.2%, function.differenti 2.2%, order 1.9%, criteria 1.8%, solut 1.5%, second 1.5%, argument 1.3%, impuls.differenti 1.1%, class 1.1%

Discriminating: differenti.equat 6.3%, differenti 5.5%, impuls 4.2%, equat 2.9%, sub 2.4%, oscil 2.3%, oscillatori 1.5%, system 1.3%, function.differenti 1.2%, second.order 1.1%, model 1.1%, criteria 0.9%, measur 0.9%, algorithm 0.8%, imag 0.7%

Focuses on differential equations such as impulse, oscillatory, and 2nd-order equations.

Cluster 27,
Size: 33, ISim: 0.139, ESim: 0.007
Descriptive: imag 25.7%, retriev 15.2%, imag.retriev 10.6%, color 7.3%, textur 3.9%, color.imag 1.8%, featur 1.3%, algorithm 1.3%, textur.imag 0.9%, similar 0.8%, feedback 0.7%, object 0.6%, coars 0.6%, region 0.6%, databas 0.5%
Discriminating: imag 10.6%, retriev 9.6%, imag.retriev 6.9%, color 4.3%, textur 2.3%, sub 2.0%, system 1.4%, color.imag 1.1%, model 1.0%, control 0.8%, time 0.6%, textur.imag 0.6%, sup 0.6%, measur 0.5%, solut 0.5%

Focuses on content & object-based image retrieval techniques.

Cluster 28,
Size: 25, ISim: 0.139, ESim: 0.008
Descriptive: edg 37.8%, imag 11.8%, edg.detect 4.3%, detect 4.2%, extract 2.2%, edg.extract 1.5%, filter 1.2%, nois 1.1%, edg.imag 0.8%, caption 0.7%, transform 0.7%, algorithm 0.6%, pixel 0.6%, histogram 0.5%, imag.edg 0.5%
Discriminating: edg 23.9%, imag 3.8%, edg.detect 2.8%, sub 2.5%, detect 1.5%, system 1.4%, model 1.0%, edg.extract 1.0%, extract 0.9%, control 0.9%, measur 0.6%, sup 0.6%, solut 0.5%, edg.imag 0.5%, design 0.5%

Focuses on edge detection imaging techniques.

Cluster 29,
Size: 19, ISim: 0.136, ESim: 0.006
Descriptive: imag 11.8%, compress 8.1%, code 7.9%, fractal 7.1%, fractal.imag 5.4%, imag.compress 3.3%, block 3.2%, imag.code 3.1%, fractal.imag.code 3.0%, error 2.6%, jpeg 2.3%, lossless 1.5%, quantiz 1.2%, distort 0.8%, mean.squar.error 0.8%
Discriminating: compress 4.2%, fractal 3.8%, code 3.8%, imag 3.5%, fractal.imag 3.4%, sub 2.1%, imag.compress 2.0%, imag.code 2.0%, fractal.imag.code 1.9%, block 1.5%, jpeg 1.4%, system 1.4%, model 1.1%, lossless 0.9%, control 0.8%

Focuses on types of image encoding and decoding techniques such as compression and fractals.

Cluster 30,
Size: 20, ISim: 0.133, ESim: 0.005
Descriptive: blast 21.1%, strata 15.7%, mine 8.0%, movement 5.1%, subsid 3.6%, strata.movement 2.4%, pillar 1.6%, coal 1.5%, seam 0.9%, cap 0.8%, surfac.subsid 0.7%, ground 0.7%, precaut 0.7%, surfac 0.6%, cast 0.6%
Discriminating: blast 12.5%, strata 9.5%, mine 3.6%, movement 2.9%, sub 2.2%, subsid 2.1%, system 1.9%, strata.movement 1.5%, pillar 1.0%, algorithm 0.8%, imag 0.8%, measur 0.7%, control 0.7%, sup 0.5%, cap 0.5%

Focuses on blasting and its effects on the strata movement of structures in mines.

Cluster 31,
Size: 30, ISim: 0.127, ESim: 0.005
Descriptive: ship 40.3%, hull 6.2%, moment 3.6%, bend.moment 3.0%, girder 2.5%, bend 2.3%, wave 1.5%, ship.hull 1.4%, hull.girder 1.2%, strength 1.1%, load 0.8%, slam 0.7%, model 0.7%, bow 0.6%, longitudin 0.5%
Discriminating: ship 24.5%, hull 3.8%, sub 2.4%, moment 2.0%, bend.moment 1.8%, system 1.7%, girder 1.5%, bend 1.3%, ship.hull 0.9%, measur 0.8%, hull.girder 0.7%, algorithm 0.7%, control 0.7%, imag 0.6%, new 0.5%

Focuses on bending moments to ship hulls and girders.

Cluster 32,
Size: 22, ISim: 0.124, ESim: 0.004
Descriptive: inequ 36.2%, map 8.2%, variat.inequ 2.8%, variat 2.4%, relax 1.9%, banach 1.7%, class 1.5%, multivalu 1.4%, space 0.9%, vector.variat 0.9%, gener.form 0.9%, refin.holder 0.9%, holder.inequ 0.9%, refin.holder.inequ 0.9%, vector 0.8%
Discriminating: inequ 20.4%, map 4.1%, sub 2.3%, system 1.7%, variat.inequ 1.6%, variat 1.3%, banach 1.0%, relax 1.0%, model 0.9%, measur 0.9%, multivalu 0.8%, algorithm 0.8%, imag 0.7%, control 0.7%, class 0.5%

Focuses on mapping of inequality spaces such as multivalue, multivariant, and Banach Spaces.

Cluster 33,
Size: 18, ISim: 0.124, ESim: 0.004
Descriptive: algebra 33.2%, lie 4.7%, algebra.surfac 2.5%, subspac.lattic 2.2%, lattic 2.1%, linear 2.1%, subspac 1.9%, functor 1.8%, space 1.7%, script 1.4%, lowen 1.2%, lowen.functor 1.2%, script.sign 1.1%, preserv 0.9%, lattic.algebra 0.9%
Discriminating: algebra 18.6%, lie 2.6%, sub 2.1%, algebra.surfac 1.4%, system 1.3%, subspac.lattic 1.3%, model 1.1%, subspac 1.0%, lattic 1.0%, functor 1.0%, measur 0.9%, script 0.8%, imag 0.7%, algorithm 0.7%, lowen 0.7%

Focuses on elements of algebra such as Lowen functors and Lie-algebra that are used in mapping and joining of subspace lattices.

Cluster 34,
Size: 50, ISim: 0.124, ESim: 0.004
Descriptive: entangl 32.1%, state 13.6%, entangl.state 6.8%, quantum 3.6%, atom 2.3%, scheme 1.9%, bell 1.6%, caviti 1.6%, photon 1.3%, teleport 1.2%, qubit 1.1%, horn 1.0%, two 0.8%, greenberg.horn.zeiling 0.8%, zeiling 0.8%
Discriminating: entangl 18.6%, state 6.0%, entangl.state 4.0%, sub 2.3%, quantum 1.6%, system 1.5%, model 1.1%, atom 1.0%, bell 0.9%, algorithm 0.8%, caviti 0.8%, imag 0.7%, teleport 0.7%, control 0.7%, qubit 0.6%

Focuses on entangled (or mixed) states of elements that can be decomposed from systems such as quantum states of atoms and photons.

Cluster 35,
Size: 35, ISim: 0.123, ESim: 0.005
Descriptive: web 44.8%, xml 6.1%, document 3.8%, inform 2.8%, page 2.1%, internet 1.8%, wrapper 1.5%, web.applic 1.5%, data 1.2%, semant 1.0%, queri 0.9%, schema 0.9%, web.page 0.9%, applic 0.8%, commerc 0.7%
Discriminating: web 26.7%, xml 3.7%, sub 2.4%, document 2.2%, page 1.2%, internet 0.9%, web.applic 0.9%, wrapper 0.9%, measur 0.9%, imag 0.8%, inform 0.7%, control 0.7%, algorithm 0.6%, system 0.6%, semant 0.6%

Focuses on elements of the web/internet.

Cluster 36,
Size: 25, ISim: 0.124, ESim: 0.006
Descriptive: reconstruct 44.5%, imag 7.5%, slice 2.1%, reconstruct.imag 2.0%, imag.reconstruct 1.6%, project 1.3%, vessel 1.1%, tomographi 0.9%, resolut 0.9%, algorithm 0.7%, medic 0.7%, model 0.6%, imag.model 0.6%, hologram 0.5%, reconstruct.algorithm 0.4%
Discriminating: reconstruct 27.5%, sub 2.5%, imag 1.8%, system 1.4%, slice 1.3%, reconstruct.imag 1.3%, imag.reconstruct 1.0%, measur 1.0%, control 0.8%, vessel 0.6%, sup 0.5%, project 0.5%, tomographi 0.5%, paper 0.5%, solut 0.5%

Focuses on image reconstruction used in fields like tomography and holography.

Cluster 37,
Size: 40, ISim: 0.122, ESim: 0.005
Descriptive: enterpris 63.1%, coal.enterpris 1.8%, market 1.3%, partner 1.2%, virtual.enterpris 1.1%, competit 1.0%, coal 0.9%, virtual 0.7%, cooper 0.7%,

competit.power 0.7%, benefit 0.7%, knowledg 0.5%, innov 0.5%, economi 0.5%, organ 0.4%
Discriminating: enterpris 37.3%, sub 2.4%, coal.enterpris 1.1%, system 0.9%, measur 0.9%, algorithm 0.8%, partner 0.7%, imag 0.7%, virtual.enterpris 0.7%, control 0.6%, market 0.6%, competit 0.5%, sup 0.5%, time 0.5%, temperatur 0.4%
Enterprises & its elements - such as virtual, coal - marketing, partners, competition, cooperation, benefits, knowledge, innovation, economics

Focuses on the elements of enterprises, such as virtual, coal, marketing, partners, competition, cooperation, benefits, knowledge, innovation, and economics.

Cluster 38,
Size: 26, ISim: 0.122, ESim: 0.005
Descriptive: train 28.5%, railwai 11.1%, passeng 7.0%, yard 3.2%, speed 2.6%, passeng.train 2.0%, logist 1.5%, freight 1.5%, path 1.3%, optim 1.1%, tree 0.9%, china 0.9%, decis 0.8%, departur 0.8%, carri.capac 0.7%
Discriminating: train 16.2%, railwai 6.5%, passeng 4.2%, sub 2.3%, yard 1.9%, system 1.5%, passeng.train 1.3%, freight 0.9%, speed 0.9%, logist 0.9%, measur 0.9%, control 0.8%, imag 0.8%, path 0.6%, algorithm 0.5%

Focuses on aspects related to trains, such as railways, cargo (freight, passenger), optimization, and speed.

Cluster 39,
Size: 39, ISim: 0.121, ESim: 0.005
Descriptive: oscil 17.7%, equat 10.2%, differ.equat 9.1%, differ 7.8%, delai 4.9%, delai.differ 3.5%, delai.differ.equat 2.1%, oscil.criteria 2.0%, condit.oscil 1.7%, oscil.solut 1.6%, criteria 1.6%, suffici 1.4%, suffici.condit 1.3%, solut 1.3%, suffici.condit.oscil 1.1%
Discriminating: oscil 9.5%, differ.equat 5.4%, differ 3.8%, equat 3.6%, sub 2.4%, delai 2.3%, delai.differ 2.1%, system 1.2%, delai.differ.equat 1.2%, oscil.criteria 1.2%, model 1.1%, condit.oscil 1.0%, oscil.solut 1.0%, measur 0.9%, control 0.8%

Focuses on aspects related to oscillation such as delay difference equations, criteria, and conditions.

Cluster 40,
Size: 23, ISim: 0.120, ESim: 0.005
Descriptive: transport 24.7%, traffic 11.5%, forecast 11.5%, urban 6.9%, urban.transport 2.2%, traffic.safeti 1.7%, china 1.6%, countri 1.6%, contain 1.6%, road 1.6%, traffic.demand 0.8%, plan 0.8%, demand 0.8%, railwai 0.7%, citi 0.7%

Discriminating: transport 13.9%, forecast 6.4%, traffic 6.3%, urban 4.0%, sub 2.2%, urban.transport 1.3%, system 1.2%, traffic.safeti 1.0%, road 0.9%, countri 0.9%, contain 0.9%, control 0.8%, imag 0.8%, algorithm 0.7%, measur 0.6%

Focuses on elements of transportation (urban, country) in China, such as traffic, safety studies, roads, plan, and demand.

Cluster 41,
Size: 53, ISim: 0.120, ESim: 0.005
Descriptive: period 20.1%, period.solut 15.4%, exist 7.8%, solut 7.4%, theorem 2.2%, equat 2.1%, exist.period 1.5%, coincid.degre 1.4%, posit.period 1.3%, posit.period.solut 1.3%, exist.period.solut 1.3%, coincid 0.9%, nonlinear 0.8%, differenti 0.8%, posit 0.8%
Discriminating: period 10.8%, period.solut 9.5%, exist 4.0%, sub 2.4%, solut 2.3%, measur 0.9%, theorem 0.9%, exist.period 0.9%, coincid.degre 0.9%, algorithm 0.8%, posit.period 0.8%, posit.period.solut 0.8%, control 0.8%, exist.period.solut 0.8%, imag 0.8%

Focuses on periodic solutions, such as existence, theorem, coincident, and nonlinear periodic solutions.

Cluster 42,
Size: 21, ISim: 0.120, ESim: 0.005
Descriptive: bound 26.3%, invers 3.3%, upper.bound 3.3%, drazin.invers 2.9%, drazin 2.9%, error.bound 2.5%, perturb 2.5%, error 2.3%, linear 2.2%, upper 2.1%, vertic.bar 2.1%, linear.system 1.5%, bar 1.3%, condit.number 1.1%, perman 0.8%
Discriminating: bound 15.0%, sub 2.2%, upper.bound 1.9%, drazin.invers 1.8%, drazin 1.8%, invers 1.7%, error.bound 1.5%, perturb 1.3%, vertic.bar 1.2%, model 1.2%, upper 1.0%, linear.system 0.8%, measur 0.8%, algorithm 0.8%, imag 0.8%

Focuses on methods for establishing bounds (such as Drazin inverse, upper, and lower) of linear systems.

Cluster 43,
Size: 25, ISim: 0.119, ESim: 0.005
Descriptive: soil 49.8%, settlement 3.2%, ground 3.0%, pile 2.8%, foundat 1.0%, soil.water 1.0%, sea 0.8%, frost.heav 0.7%, water 0.6%, frost 0.6%, layer 0.6%, soft.soil 0.6%, heav 0.6%, veget 0.5%, salt 0.5%
Discriminating: soil 29.3%, sub 2.4%, settlement 1.9%, pile 1.6%, system 1.5%, ground 1.5%, algorithm 0.8%, imag 0.8%, control 0.7%, model 0.6%, soil.water 0.6%, paper 0.6%, measur 0.5%, new 0.5%, foundat 0.5%

Focuses on settlements of soils (ground, piles, foundations, water, sea, frost/frozen soil).

Cluster 44,
Size: 26, ISim: 0.121, ESim: 0.006
Descriptive: segment 50.9%, imag 2.5%, palmprint 1.9%, algorithm 1.8%, handwrit 1.5%, featur 1.4%, segment.algorithm 1.3%, imag.segment 1.2%, line 1.2%, video 1.1%, line.segment 1.0%, color 0.7%, extract 0.6%, word 0.5%, scene 0.5%
Discriminating: segment 31.3%, sub 2.6%, system 1.5%, palmprint 1.2%, handwrit 1.0%, measur 0.9%, model 0.8%, segment.algorithm 0.8%, imag.segment 0.7%, control 0.7%, line.segment 0.6%, video 0.5%, solut 0.5%, sub.sub 0.5%, sup 0.4%

Focuses on segmentation imaging primarily associated with lines, such as palmprints & handwritting identification.

Cluster 45,
Size: 26, ISim: 0.120, ESim: 0.005
Descriptive: crack 30.2%, damag 25.6%, fatigu 1.3%, stress.intens.factor 1.1%, intens.factor 1.1%, stress.intens 1.1%, stress 1.1%, tip 1.0%, crack.tip 0.9%, repair 0.7%, materi 0.7%, creep 0.6%, blast 0.5%, fatigu.damag 0.5%, crack.size 0.5%
Discriminating: crack 17.8%, damag 15.1%, sub 2.5%, system 1.7%, control 0.8%, imag 0.8%, model 0.7%, fatigu 0.7%, stress.intens.factor 0.7%, algorithm 0.7%, intens.factor 0.7%, stress.intens 0.6%, crack.tip 0.6%, new 0.6%, measur 0.6%

Focuses on damage from cracks and fatigue.

Cluster 46,
Size: 31, ISim: 0.119, ESim: 0.005
Descriptive: blend 30.5%, cure 17.6%, epoxi 3.9%, resin 2.3%, polyurethan 1.4%, epoxi.resin 1.1%, epdm 1.0%, crosslink 0.9%, compatibil 0.9%, polyest 0.8%, org 0.7%, cyanat 0.6%, properti 0.6%, org.mmt 0.5%, acryl 0.5%
Discriminating: blend 17.8%, cure 10.4%, epoxi 2.2%, sub 1.4%, system 1.3%, resin 1.2%, model 1.1%, algorithm 0.8%, polyurethan 0.8%, measur 0.8%, control 0.7%, imag 0.7%, paper 0.7%, epoxi.resin 0.7%, epdm 0.6%

Focuses on mechanics, kinetics, and properties of preparing blends like epoxys & resins of poly-based materials (e.g. curing, crosslinking).

Cluster 47,
Size: 19, ISim: 0.119, ESim: 0.006
Descriptive: heat 7.7%, phase 4.3%, melt 4.2%, paraffin 4.1%, solid 3.4%, phase.transit 3.0%, shape.stabil 2.0%, pcm 1.8%, phase.materi 1.7%, heat.transfer

1.6%, temperatur 1.6%, materi 1.5%, npg 1.5%, solid.solid 1.4%, solid.solid.phase 1.4%

Discriminating: heat 3.4%, paraffin 2.6%, melt 2.3%, sub 2.1%, phase.transit 1.8%, solid 1.6%, system 1.4%, phase 1.3%, shape.stabil 1.3%, pcm 1.1%, phase.materi 1.1%, model 1.0%, npg 0.9%, solid.solid 0.9%, solid.solid.phase 0.9%

Focuses on characterizing the thermal conductivity of shape stabilized Phase Change Materials (PCM's) such as paraffin.

Cluster 48,
Size: 25, ISim: 0.120, ESim: 0.007

Descriptive: intellig 20.5%, control 18.3%, intellig.control 7.5%, control.system 5.6%, intellig.control.system 2.2%, control.intellig 1.7%, system 1.4%, agent 0.9%, hierarch 0.7%, multi 0.7%, activ.vibrat 0.6%, temperatur.control 0.6%, fusion 0.6%, inform.fusion 0.6%, vibrat.control 0.5%

Discriminating: intellig 12.4%, control 6.6%, intellig.control 4.9%, control.system 3.0%, sub 2.5%, intellig.control.system 1.5%, control.intellig 1.1%, model 1.0%, imag 0.8%, measur 0.7%, sup 0.6%, algorithm 0.6%, solut 0.5%, time 0.5%, sub.sub 0.5%

Focuses on intelligent control systems.

Cluster 49,
Size: 25, ISim: 0.116, ESim: 0.004

Descriptive: coat 34.4%, sprai 6.6%, grain 4.7%, bone 4.1%, arc.sprai 2.9%, arc 2.7%, binder 2.2%, grain.size 2.0%, size 1.0%, alloi 1.0%, implant 0.9%, hva 0.9%, hard 0.8%, coat.substrat 0.7%, metal 0.6%

Discriminating: coat 19.6%, sprai 3.9%, grain 2.6%, bone 2.4%, sub 2.2%, system 1.8%, arc.sprai 1.7%, arc 1.4%, binder 1.2%, grain.size 1.2%, model 1.1%, control 0.8%, algorithm 0.8%, imag 0.8%, measur 0.7%

Focuses on Methods of applying coatings to larger items such as grains, bones, and alloys (e.g. arc-spraying & implantation).

Cluster 50,
Size: 29, ISim: 0.117, ESim: 0.006

Descriptive: face 29.2%, recognit 9.3%, facial 6.6%, featur 2.9%, face.recognit 2.9%, face.imag 1.6%, imag 1.5%, view 1.1%, eigenfac 1.0%, svm 0.9%, face.detect 0.8%, local 0.8%, tast 0.8%, pattern.recognit 0.7%, match 0.7%

Discriminating: face 18.0%, recognit 5.2%, facial 4.2%, sub 2.6%, face.recognit 1.8%, system 1.5%, face.imag 1.0%, featur 1.0%, measur 0.8%, control 0.8%, eigenfac 0.6%, sup 0.5%, face.detect 0.5%, svm 0.5%, view 0.5%

Focuses on image pattern recognition primarily associated with facial recognition (biometrics).

Cluster 51,
Size: 34, ISim: 0.116, ESim: 0.005
Descriptive: mode 12.0%, dielectr 6.8%, antenna 4.0%, guid 3.5%, mode.match 2.7%, wave 2.0%, multimod 2.0%, period.structur 1.7%, nrd 1.7%, multimod.network 1.7%, period 1.5%, match 1.5%, multimod.network.theori 1.4%, combin.multimod 1.4%, combin.multimod.network 1.4%
Discriminating: mode 6.0%, dielectr 3.9%, antenna 2.2%, sub 2.1%, guid 1.9%, mode.match 1.7%, system 1.6%, multimod 1.2%, model 1.2%, period.structur 1.1%, multimod.network 1.0%, nrd 1.0%, measur 0.9%, multimod.network.theori 0.9%, combin.multimod 0.9%

Focuses on Multimode Network Theory applied to dielectric & millimeter antenna wave guides.

Cluster 52,
Size: 26, ISim: 0.116, ESim: 0.007
Descriptive: grate 45.6%, measur 7.2%, angl 3.1%, error 1.4%, diffract 1.3%, moir 0.9%, accuraci 0.7%, diffract.grate 0.7%, angl.measur 0.5%, scanner 0.5%, system 0.5%, topographi 0.5%, temperatur.strain 0.5%, fe 0.5%, encod 0.4%
Discriminating: grate 29.4%, sub 2.7%, angl 1.5%, measur 1.5%, model 1.3%, algorithm 0.9%, control 0.8%, system 0.7%, moir 0.6%, sup 0.6%, time 0.6%, imag 0.5%, solut 0.5%, diffract 0.5%, network 0.5%

Focuses on types of error measurements (caused by interference) such as angle, error, diffraction, Moire.

Cluster 53,
Size: 31, ISim: 0.114, ESim: 0.005
Descriptive: code 39.6%, decod 10.4%, turbo 2.3%, turbo.code 1.7%, encod 1.3%, error 0.8%, channel 0.7%, solomon 0.7%, reed.solomon 0.7%, algorithm 0.7%, cdma 0.6%, code.rate 0.6%, reed 0.6%, uep 0.5%, punctur 0.5%
Discriminating: code 22.3%, decod 6.2%, sub 2.3%, turbo 1.4%, turbo.code 1.0%, model 1.0%, system 1.0%, measur 0.9%, imag 0.7%, control 0.7%, encod 0.7%, temperatur 0.4%, two 0.4%, sup 0.4%, solut 0.4%

Focuses on encoding and decoding (turbo-code, Reed-Solomon codes, CDMA).

Cluster 54,
Size: 50, ISim: 0.112, ESim: 0.003

Descriptive: pulp 51.4%, bleach 10.0%, kappa.number 1.7%, kappa 1.6%, effluent 1.2%, treatment 1.0%, kraft 0.9%, bright 0.8%, kraft.pulp 0.8%, mill 0.8%, straw 0.7%, cook 0.6%, retent 0.5%, papermak 0.5%, wheat.straw 0.4%
Discriminating: pulp 29.0%, bleach 5.6%, sub 1.9%, system 1.5%, model 1.0%, kappa.number 0.9%, kappa 0.9%, algorithm 0.8%, imag 0.7%, effluent 0.7%, measur 0.6%, control 0.6%, kraft 0.5%, data 0.5%, kraft.pulp 0.4%

Focuses on pulp and bleach as applied to the papermaking process. Representative of specific elements used in decomposing.

Cluster 55,
Size: 22, ISim: 0.114, ESim: 0.006
Descriptive: tissu 10.1%, tomographi 7.4%, imag 6.7%, ultrasound 2.0%, photoacoust 1.6%, cerebr 1.6%, resolut 1.4%, depth 1.3%, optic 1.2%, signal 1.1%, sonoluminesc 1.0%, dura 0.9%, dura.mater 0.9%, confoc 0.9%, biolog 0.8%
Discriminating: tissu 6.1%, tomographi 4.6%, sub 2.5%, imag 1.4%, system 1.4%, model 1.2%, ultrasound 1.1%, photoacoust 1.0%, cerebr 1.0%, measur 0.9%, sonoluminesc 0.7%, depth 0.7%, control 0.6%, dura 0.5%, dura.mater 0.5%

Focuses on imaging tissue using tomographic imaging, ultrasound, and photoacoustic techniques.

Cluster 56,
Size: 30, ISim: 0.112, ESim: 0.005
Descriptive: land 14.6%, veget 10.1%, oasi 8.5%, desertif 5.2%, land.cover 2.9%, desert 2.9%, arid 2.9%, cover 2.8%, area 2.4%, region 1.8%, ecolog 1.1%, landscap 1.0%, sandi 0.8%, china 0.8%, ndvi 0.8%
Discriminating: land 8.6%, veget 5.9%, oasi 5.2%, desertif 3.1%, sub 2.3%, land.cover 1.7%, desert 1.7%, arid 1.7%, cover 1.5%, system 1.4%, area 0.9%, measur 0.8%, algorithm 0.8%, control 0.6%, ecolog 0.6%

Focuses on elements affecting land cover, such as vegetation, oasis (Kenya), desertification, arid, and ecology.

Cluster 57,
Size: 38, ISim: 0.112, ESim: 0.005
Descriptive: soliton 17.8%, equat 12.3%, solut 11.1%, wave 3.7%, exact 3.2%, wave.solut 3.2%, nonlinear 1.8%, tanh 1.7%, soliton.solut 1.6%, solitari.wave 1.4%, solitari 1.4%, exact.solut 1.2%, kdv 1.1%, evolut 1.1%, travel 0.9%
Discriminating: soliton 10.7%, equat 4.6%, solut 3.9%, sub 2.4%, wave.solut 1.9%, exact 1.8%, system 1.5%, wave 1.3%, model 1.1%, tanh 1.0%, soliton.solut 1.0%, measur 0.9%, solitari.wave 0.9%, control 0.8%, algorithm 0.8%

Focuses on equations and soliton solutions (e.g. waves, exact, and nonlinear solutions).

Cluster 58,
Size: 30, ISim: 0.113, ESim: 0.006
Descriptive: calibr 58.7%, error 2.7%, log 1.2%, linear.error 0.8%, measur 0.8%, sensor 0.7%, new.calibr 0.6%, instrument 0.5%, precis 0.5%, mutual.coupl 0.5%, ccd 0.5%, radiomet 0.4%, autocollim 0.4%, adc 0.4%, distort 0.3%
Discriminating: calibr 36.9%, sub 2.5%, system 1.2%, model 1.0%, error 0.8%, control 0.8%, algorithm 0.7%, log 0.7%, sup 0.5%, linear.error 0.5%, network 0.5%, imag 0.5%, sub.sub 0.5%, solut 0.5%, paper 0.4%

Focuses on error measurement calibration.

Cluster 59,
Size: 26, ISim: 0.112, ESim: 0.006
Descriptive: drive 18.0%, motor 7.6%, control 7.5%, control.rod 4.7%, rod 4.6%, drive.system 2.0%, motor.drive 1.5%, system 1.4%, reluct 1.3%, speed 1.3%, suspens 1.2%, reluct.motor 1.1%, induct 1.1%, induct.motor 1.0%, switch.reluct 1.0%
Discriminating: drive 11.0%, motor 4.6%, control.rod 3.1%, rod 2.7%, sub 2.6%, control 1.7%, drive.system 1.3%, motor.drive 0.9%, imag 0.8%, reluct 0.8%, measur 0.8%, algorithm 0.8%, model 0.8%, suspens 0.7%, reluct.motor 0.7%

Focuses on types of drive, such as systems, motors (reluctance & induction), and controls.

Cluster 60,
Size: 35, ISim: 0.112, ESim: 0.007
Descriptive: sub 14.9%, sio.sub 14.6%, sio 14.3%, tio.sub 7.2%, tio 7.1%, coat 1.7%, rutil 1.0%, sub.coat 0.7%, gel 0.7%, cao 0.7%, composit 0.6%, surfac 0.6%, sub.sio 0.6%, sub.sio.sub 0.6%, sub.composit 0.6%
Discriminating: sio.sub 9.8%, sio 9.6%, tio.sub 4.8%, tio 4.8%, sub 2.5%, system 2.0%, model 1.2%, algorithm 0.9%, control 0.9%, coat 0.8%, imag 0.8%, paper 0.7%, rutil 0.7%, measur 0.6%, data 0.5%

Focuses on property studies of SiO & TiO (rutile) substance coatings.

Cluster 61,
Size: 32, ISim: 0.112, ESim: 0.007
Descriptive: wavelet 21.1%, imag 20.6%, wavelet.transform 5.9%, transform 4.7%, compress 3.2%, imag.compress 1.7%, coder 1.4%, wavelet.coeffici 0.8%, match

0.7%, coeffici 0.7%, subband 0.6%, nois 0.6%, filter 0.5%, wavelet.imag 0.5%, high.frequenc 0.5%

<u>*Discriminating:*</u> wavelet 11.4%, imag 8.2%, wavelet.transform 3.3%, sub 2.4%, transform 1.8%, system 1.7%, compress 1.6%, model 1.2%, imag.compress 1.1%, measur 1.0%, coder 0.9%, control 0.9%, sup 0.6%, time 0.5%, wavelet.coeffici 0.5%

Focuses on image compression techniques, primarily wavelets, and coder, coefficient matching.

Cluster 62,
Size: 41, ISim: 0.111, ESim: 0.006

<u>*Descriptive:*</u> sup 21.9%, time.sup 18.1%, sup.time.sup 3.9%, time 3.6%, sup.time 3.6%, mol 3.1%, sup.mol 3.1%, mol.sup 2.7%, time.sup.time 2.7%, time.sup.mol 2.4%, sup.mol.sup 1.9%, sup.sup 1.1%, time.sup.sup 0.9%, detect.limit 0.6%, oxygen 0.5%

<u>*Discriminating:*</u> time.sup 11.6%, sup 9.8%, sup.time.sup 2.6%, sup.time 2.4%, sup.mol 2.0%, mol 1.9%, system 1.8%, sub 1.8%, mol.sup 1.8%, time.sup.time 1.8%, time.sup.mol 1.6%, model 1.3%, sup.mol.sup 1.3%, algorithm 0.9%, imag 0.8%

Focuses on grammatical constructs annotated with the words "times" (meaning multiplication) & "sup" (textual description to denote that a number as a superscript), that are primarily associated with MOLs in chemical concentration formulas.

Cluster 63,
Size: 38, ISim: 0.111, ESim: 0.006

<u>*Descriptive:*</u> fault 33.2%, diagnosi 13.5%, fault.diagnosi 8.4%, fuzzi 2.7%, wind 1.9%, network 1.3%, stator 1.1%, stator.wind 0.9%, system 0.8%, neural.network 0.6%, neural 0.6%, expert.system 0.6%, gener 0.5%, line 0.5%, expert 0.5%

<u>*Discriminating:*</u> fault 19.6%, diagnosi 8.1%, fault.diagnosi 5.3%, sub 2.6%, wind 1.0%, fuzzi 0.9%, measur 0.9%, imag 0.8%, control 0.8%, stator 0.7%, stator.wind 0.6%, algorithm 0.6%, sup 0.6%, model 0.5%, design 0.5%

Focuses on neural network methods used in expert systems fault diagnositics.

Cluster 64,
Size: 18, ISim: 0.108, ESim: 0.004

<u>*Descriptive:*</u> birefring 4.0%, omega 3.6%, pah 3.0%, laser 2.5%, dope 2.2%, pmma 1.8%, contamin 1.8%, fiber 1.6%, erbium 1.4%, azobenzen 1.3%, polym.optic 1.3%, induc 1.3%, green.laser 1.2%, pump 1.2%, 532 1.2%

<u>*Discriminating:*</u> sub 2.4%, birefring 2.3%, omega 2.0%, pah 1.8%, system 1.7%, model 1.2%, dope 1.0%, contamin 1.0%, pmma 1.0%, erbium 0.8%, control 0.8%, algorithm 0.8%, azobenzen 0.8%, polym.optic 0.8%, imag 0.7%

Focuses on properties of lasers & fiber optic materials, such as birefringence (light refraction in an anisotropic material) and polycyclic aromatic hydrocarbons (PAHs).

Cluster 65,
Size: 20, ISim: 0.109, ESim: 0.005
Descriptive: schedul 10.2%, coal.plant 7.6%, product 5.3%, machin 4.8%, plant 3.8%, coal 3.0%, plan 2.6%, product.schedul 1.6%, model 1.5%, changeov 1.4%, line 1.2%, credit 1.2%, cost 1.1%, anti 1.0%, bank 1.0%
Discriminating: schedul 6.0%, coal.plant 4.7%, sub 2.5%, machin 2.2%, plant 1.9%, product 1.7%, plan 1.3%, system 1.2%, product.schedul 1.0%, measur 1.0%, coal 0.9%, changeov 0.9%, imag 0.8%, control 0.8%, credit 0.7%

Focuses on scheduling of coal plants, production, and machines. Operating characteristics to enable the use of these systems.

Cluster 66,
Size: 34, ISim: 0.108, ESim: 0.005
Descriptive: fiber 21.3%, dispers 6.7%, pump 3.2%, gain 2.6%, amplifi 2.3%, raman 2.0%, dope.fiber 1.9%, order.dispers 1.9%, power 1.9%, erbium.dope 1.5%, erbium 1.5%, edfa 1.4%, dope 1.2%, fiber.raman 1.1%, puls 1.1%
Discriminating: fiber 11.0%, dispers 3.5%, sub 2.4%, pump 1.6%, system 1.4%, gain 1.3%, amplifi 1.2%, dope.fiber 1.2%, order.dispers 1.2%, model 1.1%, raman 1.1%, erbium.dope 0.9%, erbium 0.9%, edfa 0.9%, control 0.9%

Focuses on methods to improve the gain of fiber optics (i.e. pumping, raman amplifiers, doping, and reducing dispersion).

Cluster 67,
Size: 24, ISim: 0.108, ESim: 0.005
Descriptive: antenna 25.4%, patch 5.4%, microstrip 4.8%, micromachin 3.3%, patch.antenna 3.1%, radiat 2.3%, frequenc 2.2%, radiat.pattern 1.3%, arrai 1.3%, dd 1.3%, filter 1.2%, microstrip.antenna 1.0%, direct 0.9%, coupl.microstrip 0.9%, circular 0.8%
Discriminating: antenna 15.2%, patch 3.3%, microstrip 3.0%, sub 2.5%, micromachin 2.0%, patch.antenna 1.9%, system 1.7%, model 1.2%, radiat 1.1%, radiat.pattern 0.8%, imag 0.8%, dd 0.8%, algorithm 0.8%, control 0.6%, microstrip.antenna 0.6%

Focuses on types of micro antennas (Patch & Microstrip) and micromachining techniques.

Cluster 68,
Size: 20, ISim: 0.107, ESim: 0.004
Descriptive: bezier 11.6%, bezier.curv 9.3%, curv 6.1%, weakest.bound 2.8%, weakest 2.5%, bound.electron 2.4%, weakest.bound.electron 2.4%, approxim 2.2%, bound 1.8%, tournament 1.6%, interv.bezier.curv 1.5%, interv.bezier 1.5%, sto 1.4%, electron.potenti 1.4%, excit 1.0%
Discriminating: bezier 6.9%, bezier.curv 5.5%, curv 2.8%, sub 2.2%, weakest.bound 1.6%, weakest 1.5%, bound.electron 1.4%, weakest.bound.electron 1.4%, system 1.4%, tournament 0.9%, approxim 0.9%, interv.bezier 0.9%, interv.bezier.curv 0.9%, measur 0.9%, sto 0.8%

Focuses on methods for establishing bounds of non-linear relationships, e.g. Bezier curve, and weakest bound electron potentials.

Cluster 69,
Size: 25, ISim: 0.108, ESim: 0.005
Descriptive: ceram 22.9%, sinter 9.0%, lubric 4.2%, compact 3.7%, powder 3.1%, mechan 1.8%, warm.compact 1.3%, materi 1.2%, mechan.properti 1.2%, composit 1.1%, piezoelectr 1.1%, warm 1.0%, alumina 0.8%, properti 0.8%, osteoblast 0.7%
Discriminating: ceram 13.4%, sinter 5.2%, lubric 2.4%, sub 2.0%, compact 2.0%, system 1.9%, powder 1.4%, measur 0.9%, model 0.9%, algorithm 0.8%, warm.compact 0.8%, imag 0.8%, control 0.7%, paper 0.6%, warm 0.6%

Focuses on mechanical properties of ceramics such as sintering, and powder lubrication.

Cluster 70,
Size: 22, ISim: 0.109, ESim: 0.006
Descriptive: coal 31.9%, mine 8.7%, china 2.1%, flotat 1.7%, coal.mine 1.6%, resourc 1.6%, coal.resourc 1.3%, boiler 1.1%, econom 1.1%, chines 0.9%, advanc 0.9%, crush 0.9%, column 0.8%, system 0.7%, surfac.mine 0.7%
Discriminating: coal 17.6%, mine 4.4%, sub 2.6%, flotat 1.0%, coal.mine 0.9%, algorithm 0.9%, coal.resourc 0.8%, imag 0.8%, model 0.8%, china 0.8%, control 0.7%, resourc 0.7%, measur 0.7%, boiler 0.6%, sup 0.6%

Focuses on studies for advancing China's coal mining capacity (New 5yr Plan), such as identifying coal resources, systems (flotation, crushing, machines), and economics.

Cluster 71,
Size: 42, ISim: 0.108, ESim: 0.006

Descriptive: film 29.3%, thin.film 17.6%, thin 17.3%, substrat 1.5%, deposit 0.8%, ferroelectr 0.8%, thick 0.5%, silicon 0.5%, temperatur 0.5%, film.thick 0.5%, lubric 0.4%, resist 0.4%, layer 0.4%, electr 0.4%, ferroelectr.thin 0.3%
Discriminating: film 15.8%, thin.film 11.0%, thin 10.3%, system 1.9%, sub 1.6%, model 1.0%, algorithm 0.9%, imag 0.8%, control 0.7%, measur 0.7%, substrat 0.7%, paper 0.7%, new 0.5%, design 0.5%, network 0.5%

Focuses on characterization of thin films.

Cluster 72,
Size: 28, ISim: 0.106, ESim: 0.005
Descriptive: fire 32.0%, ignit 3.9%, catastroph 3.7%, backdraft 2.8%, fire.spread 1.8%, flame 1.4%, combust 1.3%, spread 1.3%, compart 1.0%, airflow 0.9%, ventil 0.8%, smoke 0.8%, rate 0.7%, fuel 0.7%, geometri 0.5%
Discriminating: fire 19.1%, sub 2.5%, ignit 2.4%, catastroph 2.3%, backdraft 1.8%, system 1.3%, fire.spread 1.2%, algorithm 0.9%, imag 0.7%, flame 0.7%, measur 0.7%, control 0.7%, spread 0.7%, combust 0.6%, compart 0.6%

Focuses on characterizing the ignition & spread of fire.

Cluster 73,
Size: 46, ISim: 0.105, ESim: 0.006
Descriptive: sup 35.3%, sup.sup 27.3%, sup.sup.sup 9.9%, beta 0.4%, ion 0.4%, yag 0.4%, dope 0.4%, pump 0.3%, laser 0.3%, chlorophyl 0.3%, pigment 0.3%, sampl 0.2%, zinc 0.2%, garnet 0.2%, extrus 0.2%
Discriminating: sup 17.4%, sup.sup 17.2%, sup.sup.sup 6.4%, sub 1.9%, system 1.7%, model 1.1%, algorithm 0.9%, imag 0.8%, control 0.7%, paper 0.6%, new 0.6%, design 0.5%, network 0.5%, measur 0.5%, simul 0.5%

Focuses on grammatical constructs annotated with the words BETA & SUP (textual description to denote that a number as a superscript), primarily associated with characterization studies of ion-doped materials using laser pumps (i.e. quantities that cause action).

Cluster 74,
Size: 24, ISim: 0.105, ESim: 0.006
Descriptive: wave 5.0%, groov 4.8%, helic.groov 2.8%, helic 2.5%, coupl.imped 2.0%, fdtd 1.9%, pstd 1.8%, imped 1.5%, time.domain 1.4%, lattic 1.4%, differ.time.domain 1.4%, finit.differ.time 1.4%, bandgap 1.3%, differ.time 1.3%, rectangular 1.3%

Discriminating: groov 3.0%, sub 2.6%, wave 2.0%, helic.groov 1.8%, system 1.6%, helic 1.5%, coupl.imped 1.3%, fdtd 1.2%, pstd 1.2%, model 1.1%, differ.time.domain 0.9%, finit.differ.time 0.9%, bandgap 0.8%, time.domain 0.8%, measur 0.8%

Focuses on types of millimeter wave guides (e.g. Helical-grooved).

Cluster 75,
Size: 31, ISim: 0.103, ESim: 0.005
Descriptive: combust 22.9%, releas 6.3%, heat 5.7%, heat.releas 3.9%, rate 2.6%, burn 2.6%, char 2.6%, releas.rate 2.1%, heat.releas.rate 2.0%, fire 2.0%, ignit 1.8%, flux 1.6%, radiat 1.0%, wood 1.0%, materi 0.8%
Discriminating: combust 13.7%, releas 3.7%, heat 2.4%, heat.releas 2.4%, sub 2.1%, system 1.7%, char 1.6%, burn 1.6%, releas.rate 1.3%, heat.releas.rate 1.3%, ignit 1.1%, fire 0.9%, algorithm 0.8%, flux 0.8%, control 0.8%

Focuses on characterizing combustion properties, such as heat release and burn rates.

Cluster 76,
Size: 26, ISim: 0.103, ESim: 0.005
Descriptive: membran 45.6%, blood 3.3%, cell 1.8%, lactat 1.3%, electrod 1.2%, sup 1.0%, plasma 0.8%, protein 0.8%, photosensit 0.6%, activ 0.6%, separ 0.6%, biosensor 0.5%, protein.kinas 0.5%, lipid 0.5%, kinas 0.5%
Discriminating: membran 27.7%, sub 2.0%, blood 1.9%, system 1.6%, model 1.1%, algorithm 0.9%, lactat 0.8%, imag 0.7%, cell 0.7%, control 0.6%, paper 0.6%, electrod 0.5%, structur 0.5%, measur 0.5%, design 0.5%

Focuses on analyses and effects on membranes associated with blood & cell studies, and biosensors.

Cluster 77,
Size: 32, ISim: 0.102, ESim: 0.005
Descriptive: wear 31.8%, friction 6.8%, surfac 3.9%, composit 2.4%, fret 1.8%, cuticl 1.2%, brake 1.2%, resist 1.2%, friction.wear 1.1%, wire 1.1%, wear.resist 1.0%, friction.coeffici 0.9%, abras 0.8%, steel 0.8%, layer 0.7%
Discriminating: wear 19.0%, friction 3.9%, sub 2.0%, system 1.9%, model 1.2%, fret 1.1%, surfac 1.0%, algorithm 0.8%, control 0.8%, imag 0.8%, composit 0.8%, cuticl 0.8%, brake 0.7%, measur 0.7%, friction.wear 0.7%

Focuses on the wear of surfaces of composites and steel, primarily from friction.

Cluster 78,

Size: 24, ISim: 0.104, ESim: 0.006
Descriptive: signal 11.2%, digit 10.4%, digit.signal 4.8%, dsp 4.8%, process 4.3%, signal.process 4.2%, voic 3.0%, digit.signal.process 2.1%, sampl 1.3%, fpga 1.3%, high.speed 1.3%, circuit 1.0%, speed 1.0%, processor 1.0%, digit.signal.processor 0.8%
Discriminating: digit 5.5%, signal 4.8%, digit.signal 3.1%, dsp 3.0%, sub 2.6%, signal.process 2.6%, voic 1.9%, process 1.8%, digit.signal.process 1.4%, model 1.3%, system 0.8%, fpga 0.8%, imag 0.7%, algorithm 0.7%, high.speed 0.7%

Focuses on digital signal processing for applications with voice, fpga, and high-speed processes.

Cluster 79,
Size: 22, ISim: 0.102, ESim: 0.005
Descriptive: chain 17.8%, polym 4.2%, adsorpt 3.5%, solvent 3.4%, coil 2.7%, molecular 2.1%, conform 1.9%, associ 1.6%, polysaccharid 1.3%, phase 1.2%, side.chain 1.0%, pblg 0.9%, copolym 0.8%, helix 0.7%, sticker 0.7%
Discriminating: chain 10.3%, sub 2.4%, polym 2.0%, adsorpt 1.9%, solvent 1.8%, coil 1.6%, system 1.5%, conform 1.1%, molecular 1.0%, associ 0.9%, algorithm 0.9%, model 0.8%, polysaccharid 0.8%, imag 0.8%, measur 0.7%

Focuses on chains, (primarily polymer and molecular chains) and phenomena associated with them such as adsorption, solvents, and coils (their shapes).

Cluster 80,
Size: 25, ISim: 0.103, ESim: 0.006
Descriptive: corba 20.1%, server 12.0%, client 6.6%, architectur 4.6%, client.server 3.7%, internet 3.5%, system 1.8%, librari 1.5%, paper.corba 1.2%, web 1.1%, digit.librari 0.9%, remot 0.9%, end 0.8%, embed 0.7%, api 0.6%
Discriminating: corba 12.8%, server 7.4%, client 4.1%, sub 2.5%, client.server 2.3%, architectur 2.3%, internet 2.0%, librari 0.9%, algorithm 0.8%, paper.corba 0.7%, imag 0.7%, measur 0.6%, digit.librari 0.6%, sup 0.5%, web 0.5%

Focuses on corba servers, clients, architectures (applications) related to the internet.

Cluster 81,
Size: 37, ISim: 0.101, ESim: 0.004
Descriptive: ellipt 15.6%, solut 9.1%, exist 6.8%, ellipt.equat 6.2%, semilinear 5.1%, equat 3.8%, semilinear.ellipt 2.1%, nonlinear 1.8%, boundari 1.7%, uniqu 1.7%, exist.uniqu 1.6%, dirichlet 1.2%, semilinear.ellipt.equat 1.2%, multipl.solut 1.1%, theorem 0.9%

Discriminating: ellipt 9.3%, ellipt.equat 3.7%, exist 3.3%, semilinear 3.1%, solut 2.9%, sub 2.3%, system 1.4%, semilinear.ellipt 1.3%, model 1.1%, exist.uniqu 0.9%, measur 0.9%, uniqu 0.9%, equat 0.8%, dirichlet 0.7%, semilinear.ellipt.equat 0.7%

Focuses on aspects associated with elliptical solutions such as semilinear equations, existence, and uniqueness.

Cluster 82,
Size: 34, ISim: 0.101, ESim: 0.005
Descriptive: deposit 20.2%, diamond 9.0%, film 4.8%, diamond.film 4.0%, vapor.deposit 2.5%, chemic.vapor.deposit 2.3%, chemic.vapor 2.3%, chemic 2.2%, filament 2.1%, vapor 2.0%, substrat 1.7%, coat 1.7%, hot.filament 1.5%, hot 0.9%, cvd 0.9%
Discriminating: deposit 11.9%, diamond 5.6%, diamond.film 2.5%, film 1.8%, system 1.7%, vapor.deposit 1.5%, sub 1.5%, chemic.vapor 1.4%, chemic.vapor.deposit 1.4%, filament 1.3%, vapor 1.2%, model 1.1%, hot.filament 1.0%, control 0.9%, algorithm 0.9%

Focuses on methods of deposition on smaller structures such as diamond films, filaments, and substrates (e.g. chemical vapor depostion).

Cluster 83,
Size: 30, ISim: 0.100, ESim: 0.004
Descriptive: secur 26.2%, protocol 23.6%, attack 3.2%, kei 2.1%, public.kei 2.0%, authent 1.8%, public 1.7%, system 1.4%, signatur 1.2%, formal 0.8%, audit 0.8%, monitor 0.7%, electron.commerc 0.7%, inform 0.6%, ban 0.6%
Discriminating: secur 15.2%, protocol 13.7%, sub 2.4%, attack 1.8%, public.kei 1.2%, authent 1.1%, public 1.0%, measur 0.9%, kei 0.8%, imag 0.8%, algorithm 0.7%, signatur 0.6%, sup 0.5%, control 0.5%, audit 0.5%

Focuses on security, such as protocols against attack(er) and public keying for authentication.

Cluster 84,
Size: 56, ISim: 0.101, ESim: 0.005
Descriptive: rock 59.4%, stress 2.9%, rock.mass 1.9%, damag 1.9%, fractur 0.9%, mass 0.8%, deform 0.8%, fractal 0.7%, strain 0.7%, failur 0.6%, burst 0.6%, kaiser 0.5%, strength 0.4%, blast 0.4%, discontinu 0.4%
Discriminating: rock 36.3%, sub 2.4%, system 1.7%, rock.mass 1.2%, stress 1.1%, damag 0.9%, algorithm 0.9%, control 0.8%, imag 0.7%, model 0.7%, sup 0.5%, measur 0.5%, solut 0.5%, new 0.5%, sub.sub 0.5%

Focuses on strength and fracture characteristics of rock masses (for use in mining applications).

Cluster 85,
Size: 40, ISim: 0.102, ESim: 0.007
Descriptive: sub 20.1%, dot.sub 3.5%, center.dot.sub 3.5%, sub.center.dot 3.1%, center.dot 3.1%, sub.center 3.1%, dot 2.9%, reaction 2.1%, center 1.9%, crystal 1.5%, sub.sub 1.5%, format 1.2%, morpholog 1.0%, hydrotherm 1.0%, degre 1.0%
Discriminating: sub 4.6%, center.dot.sub 2.4%, dot.sub 2.4%, sub.center.dot 2.1%, sub.center 2.1%, center.dot 1.9%, system 1.9%, dot 1.7%, model 1.4%, measur 1.1%, algorithm 0.9%, center 0.9%, control 0.8%, paper 0.8%, reaction 0.7%

Focuses on crystal formation and morphology.

Cluster 86,
Size: 25, ISim: 0.100, ESim: 0.005
Descriptive: tube 20.2%, fin 14.0%, deton 6.0%, fin.tube 2.6%, pin.fin 2.2%, draft.tube 2.2%, draft 1.7%, pin 1.3%, transfer 1.3%, heat.transfer 1.2%, pin.fin.tube 0.9%, plough 0.7%, heat 0.7%, reactor 0.7%, splice 0.7%
Discriminating: tube 11.8%, fin 8.5%, deton 3.6%, sub 2.4%, fin.tube 1.6%, pin.fin 1.3%, draft.tube 1.3%, system 1.3%, draft 1.0%, control 0.8%, algorithm 0.8%, imag 0.8%, pin 0.8%, measur 0.8%, model 0.7%

Focuses on structural heat transfer mechanisms such as tubes and fins.

Cluster 87,
Size: 23, ISim: 0.100, ESim: 0.005
Descriptive: ga 13.8%, basin 9.0%, oil 6.3%, reservoir 5.7%, ga.field 4.0%, reserv 1.9%, accumul 1.3%, jurass 1.2%, coal 1.1%, field 1.0%, upper.corner 1.0%, geochem 0.9%, rock 0.7%, upper 0.7%, hillock 0.7%
Discriminating: ga 7.2%, basin 5.4%, reservoir 3.5%, oil 3.4%, ga.field 2.5%, sub 2.4%, system 1.7%, reserv 1.1%, model 1.0%, algorithm 0.9%, imag 0.8%, jurass 0.8%, accumul 0.7%, measur 0.7%, upper.corner 0.7%

Focuses on associations with gas and accumulating it, such as fields (reservoirs, basins), Jurassic periods, coal, and geochemistry.

Cluster 88,
Size: 53, ISim: 0.100, ESim: 0.006
Descriptive: agent 46.7%, multi.agent 4.7%, agent.system 3.9%, multi 2.1%, system 2.1%, model 1.9%, ma 1.7%, multi.agent.system 1.5%, mobil.agent 1.5%, architectur 1.2%, intent 0.8%, intellig 0.8%, distribut 0.8%, mobil 0.7%, object 0.7%

Discriminating: agent 28.6%, multi.agent 3.0%, agent.system 2.5%, sub 2.5%, ma 1.1%, measur 1.0%, multi.agent.system 1.0%, mobil.agent 0.9%, imag 0.8%, multi 0.7%, algorithm 0.6%, control 0.6%, intent 0.5%, sup 0.5%, temperatur 0.5%

Focuses on multi-agent systems.

Cluster 89,
Size: 28, ISim: 0.099, ESim: 0.005
Descriptive: nuclear 8.8%, nuclear.power 6.1%, core 3.4%, fuel 3.3%, advanc 2.8%, power 2.5%, nuclear.power.plant 2.3%, reactor 2.2%, month 2.1%, record 1.9%, design 1.7%, pwr 1.6%, fuel.cycl 1.6%, month.fuel.cycl 1.6%, month.fuel 1.6%
Discriminating: nuclear 5.1%, nuclear.power 3.8%, sub 2.4%, fuel 1.8%, core 1.7%, nuclear.power.plant 1.5%, advanc 1.4%, month 1.3%, reactor 1.0%, month.fuel 1.0%, month.fuel.cycl 1.0%, fuel.cycl 1.0%, pwr 1.0%, power.plant 0.9%, measur 0.9%

Focuses on items associated with nuclear power plants and reactors, such as fuel cycles, accidents, and design.

Cluster 90,
Size: 26, ISim: 0.098, ESim: 0.005
Descriptive: market 31.6%, electr.market 5.7%, electr 5.5%, contract 2.2%, risk 2.0%, stock 1.6%, gener 1.6%, stock.market 1.6%, custom 1.1%, transact 0.9%, transmiss 0.8%, schedul 0.8%, gener.market 0.8%, truck 0.8%, power 0.7%
Discriminating: market 18.8%, electr.market 3.5%, electr 2.5%, sub 2.5%, system 1.4%, contract 1.3%, risk 1.2%, stock.market 1.0%, stock 0.9%, measur 0.9%, model 0.8%, imag 0.8%, control 0.7%, custom 0.6%, sup 0.5%

Focuses on elements of a market, such as contracts, risk, stocks, generation, customs, schedules, transactions, and transmission. Note, taxonomy similiar in electric & stock markets, but emphasis is on power generation.

Cluster 91,
Size: 81, ISim: 0.101, ESim: 0.008
Descriptive: sub 27.1%, sub.sub 6.5%, rai 3.7%, nanorod 3.0%, powder 2.4%, transmiss.electron 2.3%, diffract 2.2%, electron 2.1%, electron.microscopi 1.5%, microscopi 1.5%, transmiss 1.5%, transmiss.electron.microscopi 1.2%, product 1.2%, rai.powder.diffract 0.9%, rai.powder 0.9%
Discriminating: sub 8.2%, sub.sub 2.3%, system 2.1%, nanorod 2.1%, rai 1.8%, transmiss.electron 1.4%, model 1.4%, powder 1.2%, diffract 1.1%, algorithm 1.0%, measur 1.0%, control 0.9%, electron.microscopi 0.9%, paper 0.8%, transmiss.electron.microscopi 0.8%

Focuses on nanorods.

Cluster 92,
Size: 45, ISim: 0.101, ESim: 0.008
Descriptive: film 29.6%, sub 17.1%, deposit 3.5%, thin.film 3.5%, thin 2.7%, substrat 2.4%, sub.film 1.4%, sub.sub 1.3%, temperatur 0.6%, anneal 0.6%, sputter 0.5%, conduct 0.5%, film.deposit 0.4%, substrat.temperatur 0.4%, phase 0.4%
Discriminating: film 18.1%, sub 3.6%, thin.film 2.2%, system 2.1%, deposit 2.0%, thin 1.5%, substrat 1.4%, model 1.4%, sub.film 1.0%, algorithm 1.0%, imag 0.9%, paper 0.8%, control 0.8%, measur 0.7%, new 0.6%

Focuses on methods of growing films and depositing them on substrates.

Cluster 93,
Size: 39, ISim: 0.099, ESim: 0.006
Descriptive: stabil 15.4%, delai 12.9%, system 3.0%, time.delai 2.4%, lyapunov 2.4%, asymptot.stabil 2.2%, asymptot 2.0%, delai.depend 1.6%, linear 1.5%, system.time.delai 1.5%, time 1.4%, criteria 1.4%, lmi 1.3%, system.time 1.2%, criterion 1.0%
Discriminating: stabil 7.9%, delai 7.2%, sub 2.1%, lyapunov 1.5%, time.delai 1.5%, asymptot.stabil 1.4%, asymptot 1.1%, delai.depend 1.1%, model 1.0%, system.time.delai 0.9%, measur 0.9%, algorithm 0.8%, lmi 0.8%, imag 0.8%, system.time 0.8%

Focuses on stabilization analysis (e.g. system stability, asymptotic stability, time delays).

Cluster 94,
Size: 31, ISim: 0.097, ESim: 0.005
Descriptive: quantum 45.8%, state 4.5%, hyperspher 1.4%, quantum.state 1.1%, quantum.kei 0.9%, bound 0.8%, positronium 0.8%, orbit 0.7%, quantum.system 0.7%, clone 0.7%, qkd 0.6%, eavesdrop 0.6%, kei.distribut 0.6%, quantum.kei.distribut 0.6%, momentum 0.6%
Discriminating: quantum 26.8%, sub 2.3%, state 1.5%, system 1.2%, hyperspher 0.9%, measur 0.8%, imag 0.8%, control 0.8%, algorithm 0.7%, quantum.state 0.6%, paper 0.6%, model 0.6%, quantum.kei 0.6%, data 0.5%, sup 0.5%

Focuses on quantum states of hyperspheres, systems, orbits, and quantum key distribution (qkd). Note, these are representative of concepts that can be decomposed into discrete states.

Cluster 95,

Size: 77, ISim: 0.100, ESim: 0.008
Descriptive: sup 31.6%, sub 24.9%, sup.sub 9.1%, sub.sup 7.8%, sup.sup 1.3%, sub.sub 0.8%, sub.sup.sub 0.6%, sup.sub.sup 0.5%, state 0.4%, ion 0.4%, transit 0.4%, sub.sub.sup 0.3%, sub.sup.sup 0.3%, sup.ion 0.3%, band 0.2%
Discriminating: sup 17.5%, sub 7.3%, sup.sub 6.5%, sub.sup 5.5%, system 1.8%, model 1.1%, control 0.9%, algorithm 0.9%, imag 0.8%, measur 0.8%, paper 0.7%, sup.sup 0.7%, network 0.5%, new 0.5%, data 0.5%

Focuses on grammatical constructs annotated with the words SUP & SUB (textual descriptions to denote that numbers as subscripts & superscripts), primarily associated with the characterization of states/transition states of elements (e.g. ions/ionization).

Cluster 96,
Size: 30, ISim: 0.097, ESim: 0.005
Descriptive: bifurc 36.9%, hopf.bifurc 3.6%, hopf 3.5%, stochast 2.4%, numer 1.7%, period 1.6%, nonlinear 1.3%, system 1.0%, chao 1.0%, bifurc.period 0.9%, steadi 0.9%, limit.cycl 0.8%, discret.model 0.8%, oscil 0.7%, stabil 0.7%
Discriminating: bifurc 23.3%, sub 2.5%, hopf.bifurc 2.3%, hopf 2.2%, stochast 1.3%, measur 1.0%, imag 0.8%, algorithm 0.7%, control 0.7%, bifurc.period 0.6%, sup 0.5%, limit.cycl 0.5%, structur 0.5%, chao 0.5%, data 0.5%

Focuses on chaos theory used in bifurcation, stocastic, and non-linear problems.

Cluster 97,
Size: 64, ISim: 0.097, ESim: 0.006
Descriptive: genet 28.4%, genet.algorithm 20.7%, algorithm 14.9%, optim 3.1%, converg 1.6%, popul 1.4%, search 1.1%, crossov 0.6%, divers 0.5%, prematur 0.5%, mutat 0.5%, function 0.4%, prematur.converg 0.4%, solut 0.4%, individu 0.3%
Discriminating: genet 18.3%, genet.algorithm 13.4%, algorithm 5.2%, sub 2.6%, system 1.5%, measur 0.9%, optim 0.9%, popul 0.8%, control 0.7%, converg 0.7%, imag 0.6%, sup 0.5%, search 0.5%, structur 0.5%, temperatur 0.5%

Focuses on genetic algorithms.

Cluster 98,
Size: 21, ISim: 0.097, ESim: 0.005
Descriptive: explos 10.7%, electrolyt 4.7%, conduct 4.5%, black 4.4%, carbon.black 3.3%, carbon 2.7%, thermal 2.7%, composit 2.6%, temperatur 2.2%, fuel.cell 1.8%, thermal.conduct 1.4%, composit.electrolyt 1.3%, rubber 1.3%, fuel 1.0%, sbr 1.0%
Discriminating: explos 6.3%, electrolyt 2.8%, black 2.6%, conduct 2.2%, carbon.black 2.0%, sub 1.9%, system 1.7%, carbon 1.3%, fuel.cell 1.2%, thermal

1.0%, model 1.0%, composit 0.9%, thermal.conduct 0.9%, control 0.9%, algorithm 0.9%

Focuses on characterizing the thermal conductivity of electrolyte composite materials during explosions.

Cluster 99,
Size: 23, ISim: 0.096, ESim: 0.004
Descriptive: project 18.6%, safeti 15.9%, accid 5.5%, hydropow 2.7%, construct 2.2%, china 2.2%, capit 1.4%, fire 1.3%, gorg.project 1.0%, three.gorg.project 1.0%, wash 0.9%, econom 0.9%, scienc 0.9%, record 0.9%, gorg 0.9%
Discriminating: project 10.2%, safeti 9.0%, accid 3.2%, sub 2.4%, hydropow 1.6%, system 1.3%, model 1.0%, algorithm 0.8%, capit 0.8%, imag 0.8%, china 0.7%, measur 0.7%, construct 0.7%, gorg.project 0.6%, three.gorg.project 0.6%

Focuses on major project elements associated with safety from accidents, fire, hydropower construction (eg. Three Gorges Project), economics, and capital.

Cluster 100,
Size: 22, ISim: 0.095, ESim: 0.004
Descriptive: oil 22.3%, content 2.8%, coal 2.5%, organ 2.3%, lubric.oil 2.1%, crude 1.8%, extract 1.6%, desalt 1.5%, acid 1.4%, lubric 1.1%, tea 1.1%, crude.oil 1.0%, chemic 1.0%, macer 0.9%, petroleum 0.9%
Discriminating: oil 12.6%, sub 2.1%, system 1.6%, lubric.oil 1.3%, model 1.2%, content 1.2%, crude 1.1%, organ 1.1%, desalt 0.9%, measur 0.9%, algorithm 0.8%, imag 0.8%, control 0.8%, paper 0.7%, tea 0.6%

Focuses on oil uses (lubrication, desalting, petrochemical industry - organic), contents, extraction, and types (crude, tea).

Cluster 101,
Size: 22, ISim: 0.095, ESim: 0.004
Descriptive: landslid 21.6%, earthquak 9.8%, slope 5.0%, unload 3.3%, landslid.stabil 2.4%, tecton 1.6%, reliabl 1.3%, drill 1.3%, taiwan 1.2%, stabil 1.2%, strait 1.1%, high.slope 1.1%, factor 1.0%, upwel 1.0%, initi.unload.slope 0.9%
Discriminating: landslid 12.9%, earthquak 5.8%, slope 2.8%, sub 2.3%, unload 1.9%, system 1.6%, landslid.stabil 1.5%, tecton 0.9%, model 0.9%, imag 0.7%, algorithm 0.7%, control 0.7%, taiwan 0.7%, drill 0.7%, strait 0.7%

Focuses 0n phenomena that cause landslides, such as earthquakes, tectonic shifts, slope, and drilling.

Cluster 102,
Size: 37, ISim: 0.096, ESim: 0.006
Descriptive: knowledg 33.2%, reason 6.2%, rule 3.5%, cbr 3.0%, system 2.7%, base 2.6%, expert 2.2%, text 1.8%, decis 1.8%, languag 1.3%, knowledg.base 1.3%, expert.system 1.2%, knowledg.system 1.0%, decis.support 0.9%, intellig 0.9%
Discriminating: knowledg 20.3%, reason 3.7%, sub 2.6%, cbr 1.9%, rule 1.8%, expert 1.3%, base 1.2%, text 1.1%, measur 0.9%, decis 0.9%, imag 0.8%, knowledg.base 0.8%, control 0.8%, languag 0.7%, expert.system 0.7%

Focuses on mechanisms of knowledge based systems (Cased-Based Reasoning, Rule-Based Reasoning).

Cluster 103,
Size: 38, ISim: 0.097, ESim: 0.006
Descriptive: control 17.8%, feedback 13.5%, feedback.control 7.6%, stabil 4.3%, system 2.7%, chao 2.1%, nonlinear 1.6%, close.loop 1.0%, control.law 1.0%, output.feedback 1.0%, robust 0.9%, state.feedback 0.9%, close 0.8%, output 0.8%, chaotic 0.8%
Discriminating: feedback 8.5%, control 6.6%, feedback.control 5.1%, sub 2.6%, stabil 1.7%, chao 1.3%, imag 0.9%, algorithm 0.8%, measur 0.8%, model 0.8%, output.feedback 0.7%, control.law 0.7%, close.loop 0.7%, sup 0.6%, state.feedback 0.6%

Focuses on Feedback Control Systems (chaotic, non-linear, closed loop).

Cluster 104,
Size: 30, ISim: 0.095, ESim: 0.005
Descriptive: suffici 14.1%, suffici.condit 13.0%, condit 5.7%, stabil 2.9%, global 2.7%, suffici.condit.global 1.4%, condit.global 1.3%, exponenti.stabil 1.3%, attract 1.3%, system.suffici.condit 1.2%, singular 1.2%, system.suffici 1.1%, system 1.0%, delai 0.9%, global.asymptot 0.8%
Discriminating: suffici 8.0%, suffici.condit 7.4%, sub 2.4%, condit 1.8%, global 1.3%, stabil 0.9%, suffici.condit.global 0.9%, measur 0.8%, condit.global 0.8%, exponenti.stabil 0.8%, imag 0.8%, algorithm 0.8%, system.suffici.condit 0.7%, model 0.7%, attract 0.7%

Focuses on systems that rely on sufficient conditions, such as systems stability & control systems.

Cluster 105,
Size: 46, ISim: 0.095, ESim: 0.006

Descriptive: coal 51.9%, ga 3.0%, gasif 3.0%, seam 1.6%, coal.seam 1.5%, mine 1.3%, combust 1.2%, underground.coal 0.7%, coal.mine 0.7%, coal.gasif 0.6%, ash 0.6%, underground.coal.gasif 0.5%, ucg 0.5%, seepag 0.5%, underground 0.5%
Discriminating: coal 30.7%, sub 2.5%, gasif 1.9%, system 1.5%, ga 1.3%, coal.seam 1.0%, seam 1.0%, algorithm 0.9%, imag 0.8%, model 0.7%, combust 0.6%, control 0.6%, structur 0.5%, network 0.5%, time 0.5%

Focuses on the study of coal gasification in mines, underground and seams.

Cluster 106,
Size: 25, ISim: 0.094, ESim: 0.005
Descriptive: reactor 14.7%, chlorin 6.7%, reaction 4.9%, cellulos 3.3%, liquid 3.1%, pvc 3.1%, hydrolysi 2.7%, pyrolysi 2.0%, product 1.9%, liquid.product 1.7%, ozon 1.5%, biomass 1.2%, ga 1.1%, liquefact 1.1%, dechlorin 0.9%
Discriminating: reactor 8.6%, chlorin 4.2%, sub 2.4%, cellulos 2.0%, system 2.0%, reaction 1.9%, pvc 1.9%, hydrolysi 1.6%, liquid 1.5%, pyrolysi 1.2%, liquid.product 1.1%, ozon 0.9%, control 0.9%, algorithm 0.9%, imag 0.8%

Focuses on properties of reactors primarily associated with chloration and dechlorination processes used to remove pollutants from water/liquids. Representative of liquid reactions.

Cluster 107,
Size: 32, ISim: 0.093, ESim: 0.006
Descriptive: bid 27.4%, price 8.4%, power 4.1%, cost 3.7%, unit 3.2%, market 2.2%, gener 1.6%, reserv 1.3%, plant 1.2%, exergi 1.2%, gener.bid 1.1%, power.market 1.1%, constraint 0.8%, margin 0.8%, ancillari 0.7%
Discriminating: bid 17.9%, price 5.3%, sub 2.2%, cost 1.8%, unit 1.6%, power 1.2%, market 1.1%, measur 0.9%, imag 0.8%, reserv 0.8%, exergi 0.8%, algorithm 0.7%, gener.bid 0.7%, power.market 0.7%, control 0.6%

Focuses on elements of bids/bidding (eg. power generation), such as price/cost, unit, market, reserve, constraints, and margins.

Cluster 108,
Size: 31, ISim: 0.092, ESim: 0.005
Descriptive: glass 46.9%, dissolut 3.8%, phosphat.glass 1.2%, phosphat 1.1%, cpe 0.9%, fulleren 0.9%, glass.bead 0.8%, temperatur 0.8%, melt 0.7%, dissolut.rate 0.6%, heat 0.6%, bloom 0.6%, surfac 0.6%, bead 0.5%, fragil 0.5%
Discriminating: glass 28.0%, dissolut 2.3%, sub 2.1%, system 1.8%, model 1.2%, algorithm 0.9%, imag 0.8%, phosphat.glass 0.7%, phosphat 0.7%, paper 0.6%, cpe 0.6%, control 0.6%, fulleren 0.5%, glass.bead 0.5%, measur 0.5%

Focuses on characterization of glass, such as phosphate glass and glass beads.

Cluster 109,
Size: 21, ISim: 0.092, ESim: 0.005
Descriptive: compress 16.7%, bit 12.0%, video 4.3%, code 3.4%, queri 2.1%, codec 1.5%, scheme 1.5%, scalabl 1.5%, error 1.2%, bit.rate 1.2%, wet.compress 1.1%, multigrid 1.0%, bitstream 1.0%, data 0.8%, audio 0.8%
Discriminating: compress 9.2%, bit 7.1%, sub 2.4%, video 2.3%, system 1.8%, code 1.4%, queri 1.3%, codec 1.0%, measur 1.0%, model 0.9%, scalabl 0.9%, control 0.9%, bit.rate 0.7%, wet.compress 0.7%, multigrid 0.6%

Focuses on elements of encoding/decoding to be compressed (e.g. bits, video, code).

Cluster 110,
Size: 23, ISim: 0.093, ESim: 0.006
Descriptive: circuit 25.2%, arc 4.8%, arc.discharg 2.4%, filter 2.3%, power 1.6%, discharg 1.6%, circuit.model 1.2%, simul 1.1%, current 1.1%, hspice 0.9%, lowpass 0.8%, pinch 0.8%, wash 0.7%, dac 0.7%, cmo 0.7%
Discriminating: circuit 14.3%, arc 2.9%, sub 2.6%, arc.discharg 1.6%, system 1.4%, measur 1.0%, control 0.9%, algorithm 0.9%, discharg 0.9%, imag 0.8%, filter 0.8%, circuit.model 0.8%, hspice 0.6%, lowpass 0.6%, pinch 0.5%

Focuses on types of circuits (e.g. arc-discharging, models).

Cluster 111,
Size: 23, ISim: 0.092, ESim: 0.005
Descriptive: transact 11.7%, workflow 10.1%, cooper 8.5%, support 3.5%, languag 2.9%, mainten 2.6%, cscw 2.2%, system 2.0%, mainten.support 1.8%, environ 1.7%, agent 1.6%, concurr 1.6%, cooper.work 1.3%, mainten.time 1.1%, transact.model 1.0%
Discriminating: transact 7.1%, workflow 6.3%, cooper 5.0%, sub 2.5%, languag 1.6%, support 1.5%, mainten 1.5%, cscw 1.4%, mainten.support 1.1%, measur 0.9%, concurr 0.9%, cooper.work 0.8%, imag 0.8%, algorithm 0.8%, mainten.time 0.7%

Focuses on enablers of the use of systems, such as transactions, workflow, and cooperation.

Cluster 112,
Size: 66, ISim: 0.092, ESim: 0.006
Descriptive: fuzzi 65.5%, fuzzi.neural 1.1%, set 0.9%, neural 0.8%, cluster 0.8%, model 0.8%, fuzzi.set 0.7%, fuzzi.number 0.6%, network 0.5%, logic 0.5%,

neural.network 0.4%, paper.fuzzi 0.4%, fuzzi.neural.network 0.4%, optim 0.4%, topolog 0.4%
Discriminating: fuzzi 40.1%, sub 2.5%, system 1.0%, imag 0.8%, measur 0.8%, fuzzi.neural 0.7%, control 0.6%, solut 0.5%, sub.sub 0.5%, sup 0.5%, fuzzi.set 0.5%, equat 0.4%, temperatur 0.4%, high 0.4%, fuzzi.number 0.4%

Focuses on fuzzy neural network theory.

Cluster 113,
Size: 43, ISim: 0.090, ESim: 0.004
Descriptive: catalyst 47.4%, catalyt 7.0%, adduct 1.7%, boran 1.3%, reaction 1.3%, activ 1.3%, acid 0.9%, oxid 0.6%, coke 0.5%, oxim 0.5%, olefin 0.4%, catalyt.crack 0.4%, palladium 0.4%, synthesi 0.4%, catalyt.system 0.4%
Discriminating: catalyst 27.6%, catalyt 4.0%, sub 2.2%, system 1.5%, model 1.1%, adduct 1.0%, measur 0.8%, algorithm 0.8%, boran 0.8%, control 0.8%, imag 0.8%, paper 0.7%, time 0.5%, design 0.4%, network 0.4%

Focuses on principles of catalysts and catalytic processes/materials.

Cluster 114,
Size: 51, ISim: 0.093, ESim: 0.007
Descriptive: control 30.0%, fuzzi 14.8%, fuzzi.control 8.8%, pid 5.2%, pid.control 2.1%, self 1.3%, algorithm 0.9%, system 0.8%, tune 0.7%, neuron 0.7%, simul 0.7%, self.tune 0.6%, model 0.6%, control.algorithm 0.6%, plant 0.5%
Discriminating: control 13.7%, fuzzi 8.3%, fuzzi.control 6.1%, pid 3.6%, sub 2.3%, pid.control 1.4%, measur 1.0%, imag 0.9%, sup 0.6%, self 0.6%, system 0.5%, sub.sub 0.5%, data 0.5%, tune 0.4%, equat 0.4%

Focuses on control system algorithms (Fuzzy Control, Proportional Integral Derivative [PID] Control).

Cluster 115,
Size: 49, ISim: 0.090, ESim: 0.005
Descriptive: alloi 52.8%, cast 3.5%, microstructur 3.1%, sme 1.1%, temperatur 0.9%, properti 0.9%, bond 0.8%, martensit 0.7%, strength 0.6%, resist 0.6%, mechan 0.6%, tensil 0.5%, composit 0.5%, shape.memori 0.5%, shape 0.4%
Discriminating: alloi 31.9%, cast 2.0%, sub 2.0%, system 1.7%, microstructur 1.7%, model 1.1%, algorithm 0.9%, imag 0.8%, control 0.7%, sme 0.7%, paper 0.7%, measur 0.6%, new 0.6%, simul 0.5%, network 0.5%

Focuses on characterizing the microstructure properties of alloys, such as shape memory effect (SME), bonding, and strength.

Cluster 116,
Size: 23, ISim: 0.090, ESim: 0.005
Descriptive: ecolog 11.2%, sustain 8.9%, forest 4.1%, environment 3.8%, mine 3.4%, area 3.4%, environ 2.3%, region 2.3%, econom 2.2%, restor 1.5%, mine.area 1.3%, soil 1.3%, land 1.3%, ecolog.environ 1.2%, china 1.0%
Discriminating: ecolog 6.7%, sustain 5.4%, forest 2.5%, sub 2.5%, environment 2.1%, system 1.5%, area 1.3%, mine 1.3%, econom 1.1%, model 0.9%, environ 0.9%, restor 0.8%, control 0.8%, mine.area 0.8%, region 0.8%

Focuses on sustaining the ecology/environment of forests and soils due to mining.

Cluster 117,
Size: 22, ISim: 0.090, ESim: 0.004
Descriptive: corros 14.0%, crack 9.2%, hot 6.5%, steel 3.5%, tritium 3.3%, crack.growth 2.8%, roll 2.7%, stainless 2.3%, stainless.steel 1.7%, 316l 1.4%, fatigu 1.2%, bar 1.1%, hot.crack 1.0%, desulphur 1.0%, join 0.9%
Discriminating: corros 8.2%, crack 4.9%, hot 3.6%, sub 2.3%, tritium 2.0%, system 1.7%, steel 1.7%, crack.growth 1.7%, roll 1.4%, stainless 1.4%, stainless.steel 1.0%, model 1.0%, 316l 0.9%, control 0.8%, algorithm 0.8%

Focuses on fatigue damage (corrosion & cracks), primarily to stainless steel from tritium. Applications to nuclear power reactors.

Cluster 118,
Size: 30, ISim: 0.090, ESim: 0.005
Descriptive: waveguid 32.2%, plasma 3.9%, field 2.9%, mode 1.9%, clad 1.8%, microwav 1.7%, awg 1.7%, slot 1.5%, coupl 1.4%, field.distribut 1.3%, dielectr 1.2%, guid 0.9%, dielectr.waveguid 0.9%, cross 0.7%, wave 0.7%
Discriminating: waveguid 20.5%, sub 2.6%, plasma 2.0%, system 1.8%, model 1.3%, clad 1.1%, awg 1.1%, microwav 1.0%, slot 0.9%, control 0.9%, algorithm 0.9%, imag 0.8%, measur 0.8%, field.distribut 0.8%, field 0.7%

Focuses on elements and properties of dielectric waveguides.

Cluster 119,
Size: 32, ISim: 0.089, ESim: 0.004
Descriptive: theorem 43.3%, exist 1.8%, theorem.prove 1.5%, convex 1.3%, inclus 1.2%, space 1.2%, prove 1.1%, noncompact 1.0%, number 1.0%, decomposit.theorem 0.8%, fuzzi 0.8%, exist.theorem 0.8%, point.theorem 0.8%, fix.point.theorem 0.8%, fix.point 0.8%

Discriminating: theorem 24.8%, sub 2.3%, system 1.4%, model 1.0%, theorem.prove 0.9%, imag 0.8%, algorithm 0.8%, convex 0.7%, exist 0.7%, inclus 0.6%, noncompact 0.6%, measur 0.6%, time 0.6%, control 0.5%, prove 0.5%

Focuses on theorems used in mapping spaces (existance, fix-point).

Cluster 120,
Size: 25, ISim: 0.090, ESim: 0.005
Descriptive: video 17.3%, color 11.7%, object 10.9%, contour 2.5%, detect 2.3%, motion 1.7%, frame 1.5%, inform 1.0%, charact 1.0%, imag 0.8%, optic.inform 0.8%, metamorphosi 0.8%, text 0.8%, decompos 0.8%, shot 0.8%
Discriminating: video 10.5%, color 6.9%, object 5.6%, sub 2.5%, contour 1.5%, system 1.1%, measur 1.0%, control 0.9%, model 0.8%, motion 0.8%, frame 0.7%, algorithm 0.6%, detect 0.6%, sup 0.5%, optic.inform 0.5%

Focuses on detecting objects, contours, & motion in video and color images.

Cluster 121,
Size: 22, ISim: 0.090, ESim: 0.006
Descriptive: neutron 12.2%, sup 8.2%, center 2.1%, time.sup 1.8%, neutron.flux 1.8%, densiti 1.7%, center.dot 1.6%, dot 1.5%, grassland 1.4%, sup.center.dot 1.2%, sup.center 1.1%, center.dot.sup 1.0%, dot.sup 1.0%, heavi.metal 1.0%, graviti.center 0.8%
Discriminating: neutron 7.8%, sup 2.6%, sub 1.9%, system 1.8%, model 1.2%, neutron.flux 1.2%, time.sup 1.0%, center 0.9%, grassland 0.9%, algorithm 0.9%, center.dot 0.9%, control 0.8%, imag 0.8%, dot 0.8%, sup.center.dot 0.8%

Focuses on studies of neutron flux density behaviors in different mediums.

Cluster 122,
Size: 43, ISim: 0.089, ESim: 0.005
Descriptive: mobil 16.1%, qo 10.8%, network 10.1%, wireless 7.8%, packet 2.9%, servic 2.7%, protocol 2.1%, tcp 1.7%, mobil.agent 1.5%, handov 1.1%, agent 0.9%, scheme 0.9%, access 0.9%, node 0.8%, handoff 0.8%
Discriminating: mobil 9.6%, qo 6.9%, wireless 4.7%, network 3.6%, sub 2.5%, packet 1.7%, servic 1.6%, system 1.3%, protocol 1.1%, tcp 1.0%, mobil.agent 0.9%, measur 0.9%, imag 0.8%, model 0.7%, handov 0.7%

Focuses on mobile networks (wireless), protocols, and quality of service.

Cluster 123,
Size: 75, ISim: 0.090, ESim: 0.007

Descriptive: wavelet 31.2%, wavelet.transform 18.9%, transform 13.9%, signal 2.6%, frequenc 2.3%, detect 1.5%, time.frequenc 0.5%, code 0.4%, fault 0.4%, time 0.4%, scheme 0.4%, nois 0.4%, lift 0.3%, detect.wavelet 0.3%, scale 0.3%
Discriminating: wavelet 18.5%, wavelet.transform 12.4%, transform 7.3%, sub 2.7%, system 1.7%, model 1.2%, control 0.8%, measur 0.8%, imag 0.7%, frequenc 0.7%, signal 0.6%, sup 0.5%, sub.sub 0.5%, solut 0.5%, temperatur 0.5%

Focuses on wavelet transform used in signal detection and frequency & time applications (primarily non-imagery).

Cluster 124,
Size: 29, ISim: 0.089, ESim: 0.006
Descriptive: strain 17.9%, strain.rate 10.5%, stress 6.5%, shear 3.7%, rate 3.2%, steel 2.0%, harden 1.2%, fractur 1.2%, beryllium 0.9%, materi 0.9%, hard 0.9%, hydrogen 0.8%, soften 0.7%, wall.stress 0.7%, test 0.7%
Discriminating: strain 10.7%, strain.rate 6.8%, stress 3.1%, sub 2.2%, shear 2.0%, system 2.0%, rate 1.0%, steel 1.0%, algorithm 0.9%, control 0.8%, model 0.8%, imag 0.8%, harden 0.7%, measur 0.6%, new 0.6%

Focuses on strain and strain rate of materials, steel, and walls (also shear stress).

Cluster 125,
Size: 34, ISim: 0.089, ESim: 0.006
Descriptive: turbul 13.5%, flow 5.3%, propel 4.9%, wake 4.1%, free.surfac 3.0%, free 1.7%, turbul.model 1.6%, veloc 1.4%, numer 1.3%, surfac 1.1%, reynold 1.0%, rotat 0.9%, dimension 0.9%, flow.field 0.9%, number 0.8%
Discriminating: turbul 8.7%, propel 3.1%, wake 2.7%, sub 2.6%, flow 2.2%, free.surfac 2.0%, system 1.7%, turbul.model 1.1%, free 0.8%, control 0.8%, imag 0.8%, reynold 0.6%, algorithm 0.6%, veloc 0.6%, paper 0.6%

Focuses on characterization of turbulence, primarily wake flow turbulence.

Cluster 126,
Size: 29, ISim: 0.090, ESim: 0.006
Descriptive: power 13.4%, switch 13.0%, convert 5.5%, phase 3.6%, voltag 1.9%, power.convert 1.9%, igbt 1.9%, circuit 1.3%, drive 1.2%, soft.switch 1.1%, harmon 1.1%, motor 1.0%, switch.reluct 0.9%, reluct 0.9%, current 0.8%
Discriminating: switch 7.9%, power 6.2%, convert 3.2%, sub 2.5%, power.convert 1.3%, igbt 1.3%, phase 1.1%, algorithm 0.9%, model 0.9%, imag 0.9%, system 0.8%, voltag 0.8%, soft.switch 0.7%, measur 0.6%, switch.reluct 0.6%

Focuses on elements of power switches and power converters.

Cluster 127,
Size: 107, ISim: 0.090, ESim: 0.007
Descriptive: neural 25.3%, neural.network 23.5%, network 21.6%, learn 2.2%, algorithm 1.0%, train 0.9%, recurr 0.7%, model 0.7%, recurr.neural 0.6%, recurr.neural.network 0.5%, network.model 0.4%, global 0.4%, neural.network.model 0.3%, function 0.3%, layer 0.3%
Discriminating: neural 16.3%, neural.network 15.3%, network 11.0%, sub 2.7%, learn 1.2%, system 1.1%, imag 0.9%, measur 0.8%, sup 0.6%, sub.sub 0.5%, recurr 0.5%, equat 0.5%, temperatur 0.4%, solut 0.4%, recurr.neural 0.4%

Focuses on aspects of neural networks, such as learning, recurring, training, and algorithms.

Cluster 128,
Size: 38, ISim: 0.088, ESim: 0.005
Descriptive: polymer 35.6%, monom 6.2%, mma 3.0%, radic 2.9%, monolay 2.6%, initi 1.4%, cation 1.4%, synthes 0.9%, pda 0.9%, methyl 0.7%, radic.polymer 0.6%, surfac.pressur 0.6%, emuls 0.6%, methacryl 0.6%, methyl.methacryl 0.5%
Discriminating: polymer 21.2%, monom 3.8%, mma 1.9%, radic 1.6%, sub 1.6%, monolay 1.6%, system 1.5%, model 1.0%, algorithm 0.9%, imag 0.8%, cation 0.8%, control 0.7%, paper 0.7%, measur 0.7%, initi 0.5%

Focuses on polymers and polymerization (e.g. Methyl Methacrylate [MMA]), primarily methods used to create copolymers.

Cluster 129,
Size: 23, ISim: 0.088, ESim: 0.005
Descriptive: phenol 18.2%, extract 7.4%, wastewat 2.7%, water 2.6%, organ 1.8%, improv 1.5%, pollut 1.4%, resin 1.4%, alpha.solid 1.3%, solvent 1.2%, amin 1.2%, formaldehyd 1.1%, treatment 1.0%, alpha.solid.solut 1.0%, effluent 0.9%
Discriminating: phenol 11.3%, extract 3.5%, sub 1.7%, wastewat 1.5%, system 1.3%, model 1.2%, improv 0.9%, measur 0.9%, control 0.9%, algorithm 0.9%, alpha.solid 0.8%, organ 0.8%, imag 0.8%, pollut 0.8%, paper 0.7%

Focuses on extraction and degradation of phenol solutions from wastewater, resins, and pollution.

Cluster 130,
Size: 56, ISim: 0.089, ESim: 0.007
Descriptive: mine 50.1%, data 3.6%, data.mine 3.1%, system 2.4%, coal 1.4%, databas 1.3%, decis 1.2%, coal.mine 1.2%, geolog 0.7%, system.mine 0.6%, model 0.6%, inform 0.5%, mine.system 0.4%, applic 0.4%, fuzzi 0.4%

Discriminating: mine 32.5%, sub 2.5%, data.mine 2.2%, imag 0.8%, data 0.8%, coal.mine 0.7%, databas 0.6%, measur 0.6%, decis 0.6%, sup 0.5%, temperatur 0.5%, sub.sub 0.5%, solut 0.5%, equat 0.5%, algorithm 0.5%

Focuses on types of mining, such as coal, data, and information mining.

Cluster 131,
Size: 25, ISim: 0.087, ESim: 0.005
Descriptive: deform 35.3%, shear.deform 2.1%, frozen.wall 1.7%, shear 1.7%, frozen 1.4%, plastic 1.3%, leakag 1.1%, excav 1.0%, displac 0.9%, deform.theori 0.9%, back 0.8%, plastic.deform 0.7%, extrus 0.7%, flang 0.7%, profil.extrus 0.7%
Discriminating: deform 20.5%, sub 2.5%, system 1.7%, shear.deform 1.3%, frozen.wall 1.1%, measur 0.9%, frozen 0.9%, control 0.8%, algorithm 0.8%, shear 0.8%, imag 0.8%, plastic 0.6%, leakag 0.6%, excav 0.6%, deform.theori 0.5%

Focuses on modeling and characterization of shear and plastic deformation, primarily with frozen walls.

Cluster 132,
Size: 48, ISim: 0.089, ESim: 0.006
Descriptive: remot.sens 12.1%, remot 10.9%, imag 10.2%, sens 10.1%, land 3.5%, sens.imag 2.7%, remot.sens.imag 2.7%, classif 2.3%, spectral 1.8%, band 1.6%, data 1.5%, hyperspectr 1.5%, inform 0.8%, pixel 0.8%, cover 0.8%
Discriminating: remot.sens 8.0%, remot 6.9%, sens 6.3%, imag 3.1%, sub 2.5%, land 2.2%, sens.imag 1.8%, remot.sens.imag 1.8%, system 1.8%, classif 1.2%, spectral 1.0%, hyperspectr 1.0%, control 0.9%, model 0.7%, band 0.7%

Focuses on remote sensing imaging (classification, spectral bands, hyperspectral, information, and pixels) of land.

Cluster 133,
Size: 22, ISim: 0.089, ESim: 0.007
Descriptive: learn 5.8%, classif 3.2%, perceptron 2.4%, neural 2.1%, multilay.perceptron 2.1%, power 1.9%, neural.network 1.9%, weld 1.6%, transient.stabil 1.4%, multilay 1.4%, adapt 1.3%, network 1.1%, learn.rule 1.1%, load.forecast 1.1%, load 1.0%
Discriminating: learn 3.4%, sub 2.6%, classif 1.8%, perceptron 1.6%, multilay.perceptron 1.4%, system 1.0%, transient.stabil 1.0%, measur 0.9%, weld 0.9%, model 0.9%, imag 0.9%, multilay 0.9%, neural 0.8%, neural.network 0.7%, learn.rule 0.7%

Focuses on learning, perceptron, classification, and neural networks.

Cluster 134,
Size: 35, ISim: 0.087, ESim: 0.005
Descriptive: receiv 15.7%, channel 11.6%, cdma 3.4%, estim 2.2%, rake 2.0%, blind 1.7%, code 1.5%, ber 1.3%, channel.estim 1.3%, divers 1.2%, blind.adapt 1.2%, rake.receiv 1.2%, adapt 1.1%, antenna 1.1%, cdma.system 1.0%
Discriminating: receiv 9.6%, channel 6.2%, sub 2.5%, cdma 2.0%, rake 1.2%, estim 1.0%, blind 1.0%, measur 0.9%, model 0.9%, ber 0.8%, channel.estim 0.8%, imag 0.8%, control 0.8%, blind.adapt 0.7%, rake.receiv 0.7%

Focuses on channels and receivers (CDMA, Estimation, Rake Receiver, Blind Adaptation).

Cluster 135,
Size: 33, ISim: 0.086, ESim: 0.004
Descriptive: matric 36.0%, sequenc 8.2%, matrix 5.9%, nonsingular 2.3%, linear 1.4%, clutter 1.2%, condit 1.0%, rank 0.9%, nonsingular.matric 0.7%, polynomi 0.7%, quaternion 0.6%, expon 0.6%, dioid 0.6%, comput.sensit.matric 0.5%, comput.sensit 0.5%
Discriminating: matric 21.5%, sequenc 4.2%, matrix 2.7%, sub 2.4%, system 1.4%, nonsingular 1.4%, model 1.0%, measur 0.9%, control 0.8%, imag 0.8%, clutter 0.7%, algorithm 0.7%, paper 0.5%, sup 0.5%, rank 0.5%

Focuses on terms associated with matrices (e.g. sequencing, non-singular, linear, rank).

Cluster 136,
Size: 49, ISim: 0.088, ESim: 0.006
Descriptive: differenti.equat 18.6%, differenti 16.9%, equat 16.5%, ordinari.differenti 3.4%, ordinari.differenti.equat 3.0%, ordinari 2.7%, partial.differenti 1.6%, partial.differenti.equat 1.4%, solut 1.0%, partial 1.0%, nonlinear 0.9%, boundari 0.7%, order.ordinari.differenti 0.4%, order.ordinari 0.4%, gild 0.4%
Discriminating: differenti.equat 11.8%, differenti 9.8%, equat 7.4%, sub 2.6%, ordinari.differenti 2.2%, ordinari.differenti.equat 2.0%, ordinari 1.7%, system 1.4%, partial.differenti 1.1%, measur 0.9%, partial.differenti.equat 0.9%, imag 0.8%, model 0.7%, algorithm 0.7%, control 0.5%

Focuses on differential equations (ordinary, partial).

Cluster 137,
Size: 55, ISim: 0.087, ESim: 0.006

Descriptive: nois 47.9%, signal 12.8%, signal.nois 1.8%, wavelet 1.0%, threshold 0.8%, signal.nois.ratio 0.7%, nois.ratio 0.7%, detect 0.7%, weak 0.6%, nois.signal 0.6%, snr 0.6%, lna 0.5%, ratio 0.4%, filter 0.4%, interfer 0.4%
Discriminating: nois 29.6%, signal 5.9%, sub 2.4%, signal.nois 1.2%, system 1.1%, imag 0.7%, control 0.7%, sup 0.5%, model 0.5%, solut 0.5%, measur 0.5%, sub.sub 0.5%, nois.ratio 0.5%, signal.nois.ratio 0.5%, algorithm 0.4%

Focuses on signal to noise ratios (SNR).

Cluster 138,
Size: 49, ISim: 0.085, ESim: 0.006
Descriptive: electron 7.1%, microscopi 6.8%, electron.microscopi 6.6%, rai 5.6%, diffract 3.5%, transmiss.electron 3.4%, transmiss.electron.microscopi 3.2%, transmiss 2.1%, powder 1.6%, rai.diffract 1.5%, product 1.3%, scan.electron 1.0%, nanostructur 0.9%, tem 0.9%, spectroscopi 0.9%
Discriminating: electron.microscopi 4.0%, microscopi 3.9%, electron 3.2%, rai 2.7%, transmiss.electron 2.0%, transmiss.electron.microscopi 2.0%, system 1.8%, sub 1.8%, diffract 1.7%, model 1.3%, algorithm 0.9%, transmiss 0.8%, paper 0.8%, rai.diffract 0.8%, control 0.7%

Focuses on the use of transmission electron microscopy (TEM) primarily used to characterize grain diffraction, powders, and nanostructures.

Cluster 139,
Size: 58, ISim: 0.085, ESim: 0.006
Descriptive: fiber 42.8%, optic.fiber 11.5%, optic 10.2%, fiber.optic 1.2%, grate 1.1%, sensor 0.9%, laser 0.7%, light 0.4%, fiber.grate 0.4%, detect 0.4%, coupl 0.4%, distribut 0.4%, probe 0.4%, mode 0.3%, filter 0.3%
Discriminating: fiber 26.6%, optic.fiber 7.7%, optic 4.9%, sub 2.6%, system 1.1%, model 1.0%, algorithm 0.9%, fiber.optic 0.8%, imag 0.8%, control 0.8%, grate 0.5%, solut 0.5%, data 0.5%, sub.sub 0.5%, measur 0.5%

Focuses on uses of fiber optics and lasers, such as fiber optic sensors, fiber lasers, and lasers.

Cluster 140,
Size: 38, ISim: 0.086, ESim: 0.007
Descriptive: control 17.5%, adapt 10.4%, adapt.control 5.5%, system 2.8%, robust 2.3%, predict 2.1%, predict.control 2.0%, delai 1.9%, time.delai 1.6%, track 1.6%, chaotic 1.4%, nonlinear 1.2%, algorithm 1.0%, control.system 0.9%, decentr 0.9%
Discriminating: control 6.9%, adapt 6.2%, adapt.control 4.0%, sub 2.7%, predict.control 1.4%, predict 1.4%, robust 1.3%, time.delai 1.1%, measur 1.1%, imag 0.9%, delai 0.8%, chaotic 0.8%, track 0.8%, decentr 0.6%, sup 0.6%

Focuses on adaptive control system, primarily predictive, robust, and non-linear systems.

Cluster 141,
Size: 41, ISim: 0.085, ESim: 0.006
Descriptive: robot 45.4%, control 4.9%, teleoper 2.1%, trajectori 1.8%, motion 1.4%, track 1.4%, path 1.3%, weld 1.1%, system 0.8%, control.robot 0.7%, space.robot 0.6%, robot.system 0.6%, mobil 0.6%, avoid 0.5%, joint 0.5%
Discriminating: robot 29.2%, sub 2.7%, teleoper 1.4%, trajectori 1.1%, control 0.8%, imag 0.8%, measur 0.7%, path 0.7%, algorithm 0.7%, motion 0.6%, track 0.6%, weld 0.6%, sup 0.6%, temperatur 0.5%, sub.sub 0.5%

Focuses on robotic control.

Cluster 142,
Size: 22, ISim: 0.084, ESim: 0.005
Descriptive: surfac 12.7%, fractal 6.7%, sphere 5.6%, rough 4.5%, mass 1.7%, cut 1.5%, rough.surfac 1.5%, dimens 1.4%, fractal.dimens 1.3%, legendr 1.3%, fractal.dimens.scale 1.2%, dimens.scale 1.2%, surfac.rough 1.1%, spheric.surfac 1.1%, hausdorff 1.0%
Discriminating: surfac 5.4%, fractal 3.6%, sphere 3.4%, rough 2.6%, sub 2.4%, system 1.8%, rough.surfac 1.0%, algorithm 0.9%, legendr 0.8%, mass 0.8%, cut 0.8%, fractal.dimens 0.8%, dimens.scale 0.8%, fractal.dimens.scale 0.8%, control 0.7%

Focuses on characterizing surface roughness, primarily spherical surfaces.

Cluster 143,
Size: 28, ISim: 0.083, ESim: 0.005
Descriptive: size 9.1%, nano 7.5%, powder 7.2%, pore 4.7%, size.distribut 2.9%, particl 2.7%, liposom 2.1%, membran 2.0%, dispers 1.8%, pore.size 1.4%, mesopor 1.2%, metal 1.2%, ultrafin.metal 1.1%, particl.size 1.1%, nano.powder 1.1%
Discriminating: nano 4.5%, size 4.3%, powder 3.8%, pore 2.7%, sub 1.9%, system 1.9%, size.distribut 1.8%, liposom 1.3%, model 1.2%, particl 1.0%, membran 1.0%, measur 0.9%, pore.size 0.9%, algorithm 0.9%, imag 0.8%

Focuses on characteristics associated with size and size distribution, primarily related to small particles (e.g. nanoparticles, powders, pores, liposomes, & membranes).

Cluster 144,

Size: 50, ISim: 0.083, ESim: 0.005
Descriptive: abstract.record 11.3%, abstract 11.2%, edit 10.9%, edit.abstract 10.3%, edit.abstract.record 9.5%, record 7.9%, alcatel 2.3%, firm 1.0%, market 0.8%, pcc 0.7%, asia.pacif 0.7%, knowledg 0.6%, pacif 0.6%, compani 0.6%, china 0.6%
Discriminating: abstract.record 6.9%, edit 6.6%, abstract 6.5%, edit.abstract 6.3%, edit.abstract.record 5.9%, record 3.7%, sub 2.4%, alcatel 1.5%, system 1.1%, algorithm 0.9%, imag 0.7%, firm 0.6%, measur 0.6%, control 0.6%, model 0.6%

Focuses on companies doing marketing research for knowledge development, such as Alcatel, and Asia-Pacific. Some relation to PCC (Passive Containment Cooling).

Cluster 145,
Size: 98, ISim: 0.086, ESim: 0.008
Descriptive: sub 57.5%, sub.sub 18.9%, crystal 1.0%, sub.sub.sub 0.8%, temperatur 0.5%, degre 0.2%, reaction 0.2%, compound 0.2%, room 0.2%, alpha 0.2%, sup 0.2%, composit 0.1%, phase 0.1%, optic 0.1%, beta 0.1%
Discriminating: sub 27.1%, sub.sub 10.6%, system 1.9%, model 1.3%, algorithm 1.1%, imag 1.0%, control 0.9%, paper 0.9%, measur 0.9%, network 0.6%, time 0.5%, design 0.5%, new 0.5%, data 0.5%, simul 0.5%

Focuses on environmental parameters that affect the reactions of compounds and crystals such as temperature.

Cluster 146,
Size: 27, ISim: 0.082, ESim: 0.005
Descriptive: element 23.8%, plate 4.4%, thick.plate 1.4%, thick 1.3%, shear 1.2%, bem 0.9%, thin.plate 0.8%, quadrilater 0.7%, mesh 0.7%, tall.build 0.7%, satw 0.7%, 9000 0.7%, elast 0.7%, thin 0.6%, plate.bend 0.6%
Discriminating: element 12.9%, sub 2.6%, plate 2.3%, system 1.9%, thick.plate 0.9%, measur 0.9%, imag 0.8%, control 0.8%, algorithm 0.7%, model 0.6%, bem 0.6%, thick 0.5%, thin.plate 0.5%, shear 0.5%, quadrilater 0.5%

Focuses on mechanical behavior of thick and thin plate elements.

Cluster 147,
Size: 29, ISim: 0.082, ESim: 0.006
Descriptive: fluid 22.3%, flow 9.0%, car 4.9%, traffic 4.5%, pedestrian 2.8%, traffic.flow 2.2%, model 2.2%, pressur 1.4%, veloc 1.3%, fluid.flow 1.1%, porou.media 0.8%, jam 0.7%, asphalt 0.7%, mantl 0.6%, densiti 0.5%
Discriminating: fluid 13.9%, flow 4.2%, car 3.1%, traffic 2.6%, sub 2.3%, pedestrian 1.9%, system 1.5%, traffic.flow 1.5%, algorithm 0.8%, control 0.7%, measur 0.7%, imag 0.7%, fluid.flow 0.7%, new 0.6%, sup 0.6%

Focuses on flow quantities, such as fluid, cars, traffic, and pedestrians.

Cluster 148,
Size: 47, ISim: 0.081, ESim: 0.004
Descriptive: copolym 39.7%, graft 4.9%, swell 1.7%, copolymer 1.3%, methacryl 1.1%, poli 1.1%, styren 1.0%, water 0.9%, block 0.9%, nonwoven 0.8%, micel 0.8%, block.copolym 0.8%, ethylen 0.7%, dvb 0.7%, crosslink 0.7%
Discriminating: copolym 23.6%, graft 2.9%, sub 2.3%, system 1.8%, model 1.1%, swell 1.0%, algorithm 0.8%, copolymer 0.8%, imag 0.8%, control 0.8%, paper 0.7%, measur 0.7%, methacryl 0.6%, styren 0.6%, time 0.5%

Focuses on studies of types of copolymers, such as the grafting processes used to create them.

Cluster 149,
Size: 46, ISim: 0.081, ESim: 0.005
Descriptive: fiber 22.5%, composit 7.8%, reinforc 5.0%, strength 3.9%, interfaci 2.7%, matrix 2.4%, properti 2.2%, polypropylen 2.1%, fiber.reinforc 1.5%, mechan.properti 1.5%, concret 1.4%, tensil 1.2%, glass 1.0%, mechan 0.9%, matrix.composit 0.8%
Discriminating: fiber 12.1%, composit 3.7%, reinforc 3.0%, sub 2.4%, strength 1.8%, interfaci 1.7%, system 1.7%, polypropylen 1.3%, model 1.2%, matrix 1.0%, fiber.reinforc 1.0%, algorithm 0.9%, measur 0.8%, imag 0.8%, mechan.properti 0.8%

Focuses on the physics of reinforcement for fibers, composites, polypropylene, concrete, and glass.

Cluster 150,
Size: 39, ISim: 0.081, ESim: 0.005
Descriptive: boundari 35.5%, solut 4.3%, boundari.condit 3.5%, condit 3.0%, exist 1.4%, monoton 1.2%, iter 1.2%, numer 1.1%, function 0.9%, order 0.9%, piezoelectr.materi 0.8%, order.boundari 0.7%, period.boundari 0.7%, artifici.boundari 0.7%, piezoelectr 0.6%
Discriminating: boundari 21.2%, sub 2.5%, boundari.condit 2.1%, system 1.7%, model 1.2%, solut 1.0%, measur 0.9%, control 0.9%, imag 0.8%, monoton 0.7%, condit 0.7%, algorithm 0.7%, time 0.6%, sup 0.6%, iter 0.5%

Focuses on aspects of boundaries, such as solutions, existence, and boundary conditions.

Cluster 151,
Size: 25, ISim: 0.081, ESim: 0.005

Descriptive: hydrogen 11.1%, dmc 3.8%, catalyst 3.3%, benzen 3.3%, methanol 3.2%, carbon 2.4%, carbonyl 1.9%, oxid 1.8%, reaction 1.6%, hydrocrack 1.4%, methan 1.4%, liquid 1.3%, pressur 1.3%, dimethyl.carbon 1.2%, reactor 1.0%
Discriminating: hydrogen 6.4%, dmc 2.4%, benzen 2.0%, sub 2.0%, methanol 2.0%, catalyst 1.6%, system 1.3%, carbonyl 1.2%, carbon 1.1%, hydrocrack 0.9%, control 0.9%, algorithm 0.9%, imag 0.8%, dimethyl.carbon 0.8%, methan 0.7%

Focuses on characterizing reactions and catalyst involving hydrogen and dimethyl carbonate (DMC), i.e gas reactions.

Cluster 152,
Size: 50, ISim: 0.081, ESim: 0.005
Descriptive: vibrat 56.7%, wind 1.8%, engin 1.0%, theori 0.7%, vibrat.characterist 0.7%, build 0.6%, isol 0.6%, wind.pressur 0.5%, damp 0.5%, ultrason 0.5%, calcul 0.4%, frequenc 0.4%, characterist 0.4%, induc.vibrat 0.4%, model 0.4%
Discriminating: vibrat 35.2%, sub 2.5%, system 1.1%, wind 0.9%, algorithm 0.9%, imag 0.8%, sup 0.6%, engin 0.5%, time 0.5%, control 0.5%, measur 0.5%, network 0.5%, data 0.5%, sub.sub 0.5%, solut 0.5%

Focuses on vibrational analysis primarily due to wind and engines. Applications could include naval ships & missile launchers.

Cluster 153,
Size: 20, ISim: 0.080, ESim: 0.004
Descriptive: space 5.2%, class 3.9%, poisson 3.2%, multi.symplect 2.7%, motion 2.4%, parabol 2.4%, symplect 2.1%, singular 2.0%, par 1.6%, conjug 1.5%, discret 1.3%, number 1.2%, passiv.redund 1.1%, sheet 1.1%, robot 1.0%
Discriminating: sub 2.4%, space 2.1%, poisson 1.9%, class 1.8%, system 1.7%, multi.symplect 1.7%, parabol 1.4%, symplect 1.3%, motion 1.1%, singular 1.0%, par 1.0%, model 0.9%, measur 0.9%, control 0.8%, algorithm 0.8%

Focuses on using various mathematical methods to join items such as geometric spaces (e.g. lass, poisson, parabolic, and symplectic).

Cluster 154,
Size: 43, ISim: 0.082, ESim: 0.007
Descriptive: test 39.6%, test.system 10.5%, system 3.4%, automat.test.system 2.0%, automat.test 1.7%, automat 1.4%, design 1.0%, calibr 0.9%, remot.test 0.6%, precis 0.6%, high.precis 0.6%, vxibu 0.6%, paper.test 0.5%, paper 0.5%, high 0.4%
Discriminating: test 22.2%, test.system 7.1%, sub 2.8%, automat.test.system 1.4%, automat.test 1.2%, model 0.9%, imag 0.9%, algorithm 0.7%, control 0.7%, automat 0.6%, sup 0.6%, measur 0.6%, sub.sub 0.5%, equat 0.5%, solut 0.5%

Focuses on systems tests (primarily automated) for design, calibration, and precision.

Cluster 155,
Size: 36, ISim: 0.080, ESim: 0.005
Descriptive: polym 34.3%, poli 2.9%, viscos 1.7%, polycondens 1.1%, humid 1.0%, emit 0.9%, blend 0.9%, polym.polym 0.9%, acid 0.9%, interact 0.8%, melt 0.7%, styren 0.6%, dilut 0.6%, microspher 0.6%, spectra 0.6%
Discriminating: polym 20.3%, sub 2.0%, system 1.8%, poli 1.5%, viscos 0.9%, model 0.9%, control 0.8%, algorithm 0.8%, imag 0.7%, polycondens 0.7%, paper 0.7%, humid 0.6%, polym.polym 0.6%, emit 0.6%, time 0.5%

Focuses on characterizing polymers.

Cluster 156,
Size: 58, ISim: 0.080, ESim: 0.006
Descriptive: puls 46.9%, laser 6.1%, laser.puls 1.8%, reactor 1.6%, width 1.5%, puls.width 1.2%, puls.reactor 0.8%, femtosecond 0.8%, ultrashort 0.7%, durat 0.7%, experiment 0.6%, laser.system 0.6%, switch 0.6%, oper 0.5%, calcul 0.5%
Discriminating: puls 29.6%, sub 2.6%, laser 2.5%, laser.puls 1.2%, system 1.0%, model 1.0%, algorithm 0.9%, imag 0.9%, control 0.8%, puls.width 0.8%, width 0.8%, reactor 0.7%, paper 0.7%, puls.reactor 0.6%, measur 0.5%

Focuses on types of pulses (laser, reactor, width).

Cluster 157,
Size: 31, ISim: 0.078, ESim: 0.005
Descriptive: iter 18.1%, equat 8.3%, converg 5.9%, analyt 3.0%, solut 2.9%, analyt.solut 2.0%, invers 1.8%, homotopi 1.3%, variat 1.3%, nonlinear 1.2%, numer 1.0%, deriv 0.8%, aor 0.8%, approxim 0.7%, calcul 0.7%
Discriminating: iter 11.0%, converg 3.1%, equat 2.9%, sub 2.6%, analyt 1.5%, system 1.4%, analyt.solut 1.3%, model 1.0%, invers 1.0%, homotopi 0.9%, imag 0.8%, variat 0.7%, measur 0.7%, control 0.6%, sup 0.6%

Focuses on aspects of iterative equations and solutions, such as convergence, homotopy, and analytical & inverse solutions.

Cluster 158,
Size: 54, ISim: 0.079, ESim: 0.006
Descriptive: wavelet 46.2%, signal 3.6%, nois 3.0%, scale 1.7%, function 1.5%, scale.function 1.1%, coeffici 1.1%, wavelet.coeffici 1.0%, algorithm 1.0%,

multiresolut 0.8%, multiwavelet 0.7%, threshold 0.7%, mother 0.6%, mother.wavelet 0.6%, orthogon 0.5%
Discriminating: wavelet 28.3%, sub 2.6%, system 2.0%, nois 1.2%, signal 1.1%, control 0.9%, measur 0.9%, model 0.8%, scale.function 0.8%, wavelet.coeffici 0.7%, scale 0.7%, solut 0.5%, temperatur 0.5%, multiresolut 0.5%, sub.sub 0.5%

Focuses on aspects of wavelets used in signal processing.

Cluster 159,
Size: 33, ISim: 0.077, ESim: 0.005
Descriptive: liquid 7.3%, flow 5.1%, shear 4.8%, pressur 4.6%, melt 3.6%, viscos 2.4%, shear.viscos 2.1%, temperatur 2.0%, extrus 1.7%, critic 1.2%, condens 1.0%, kpa 1.0%, vapour 1.0%, capillari 0.9%, die 0.7%
Discriminating: liquid 4.0%, shear 2.7%, melt 2.1%, flow 2.0%, pressur 1.9%, sub 1.8%, system 1.7%, shear.viscos 1.4%, viscos 1.4%, extrus 1.0%, algorithm 0.9%, model 0.9%, imag 0.8%, control 0.8%, paper 0.7%

Focuses on properties of liquied and flow that can be measured and analyzed (e.g. shear, pressure, melt, and viscosity).

Cluster 160,
Size: 29, ISim: 0.077, ESim: 0.006
Descriptive: power 10.6%, control 4.0%, reactiv.power 2.6%, chd 2.0%, power.control 2.0%, scheme 1.9%, video 1.8%, reactiv 1.8%, polymorph 1.7%, patient 1.4%, optim 1.0%, power.optim 1.0%, genotyp 1.0%, gene 0.9%, voltag 0.9%
Discriminating: power 4.5%, sub 2.5%, reactiv.power 1.7%, chd 1.4%, power.control 1.3%, model 1.1%, polymorph 1.1%, measur 1.0%, reactiv 1.0%, video 0.9%, system 0.9%, patient 0.9%, imag 0.8%, power.optim 0.7%, genotyp 0.7%

Focuses on power controller (eg. reactive power) for circuits primarily associated with communications.

Cluster 161,
Size: 34, ISim: 0.075, ESim: 0.004
Descriptive: compound 24.8%, sulfur 6.3%, rare.earth 3.7%, rare 3.3%, earth 2.8%, isol 1.7%, sulfur.compound 1.3%, synthes 1.3%, phosphon 1.0%, acid 1.0%, structur.spectroscop 0.8%, spectroscop 0.8%, solvent 0.6%, nmr 0.6%, complex 0.5%
Discriminating: compound 13.9%, sulfur 3.7%, sub 2.3%, rare.earth 2.2%, rare 2.0%, system 1.7%, earth 1.5%, model 1.2%, isol 0.9%, measur 0.8%, algorithm 0.8%, sulfur.compound 0.8%, imag 0.8%, paper 0.7%, control 0.7%

Focuses on characterizing sulfer and rare earth compounds using spectroscopic techniques.

Cluster 162,
Size: 45, ISim: 0.077, ESim: 0.006
Descriptive: filter 47.4%, speech 2.9%, kalman 1.7%, detect 1.6%, kalman.filter 1.5%, covari 0.8%, digit 0.8%, outlier 0.7%, nois 0.7%, filter.bank 0.6%, digit.filter 0.6%, input 0.6%, new 0.5%, signal 0.5%, bank 0.4%
Discriminating: filter 29.5%, sub 2.0%, speech 1.8%, kalman 1.2%, system 1.0%, kalman.filter 1.0%, model 0.9%, control 0.8%, measur 0.7%, algorithm 0.7%, imag 0.6%, covari 0.5%, sup 0.5%, solut 0.5%, outlier 0.5%

Focuses on digital noise filters, primarily for filtering noise out of digital speech applications (eg. Kalman filter).

Cluster 163,
Size: 28, ISim: 0.076, ESim: 0.006
Descriptive: current 7.5%, squeez 4.3%, ground 3.3%, harmon 3.3%, grid 2.9%, oscil 2.5%, corona 2.0%, frequenc 1.8%, ground.grid 1.5%, line 1.3%, puls 1.3%, insul.corona 1.2%, insul 1.2%, insul.corona.puls 1.0%, corona.puls 1.0%
Discriminating: current 3.6%, squeez 2.8%, sub 2.7%, harmon 1.9%, ground 1.8%, grid 1.8%, corona 1.4%, oscil 1.1%, ground.grid 1.0%, system 1.0%, imag 0.8%, insul.corona 0.8%, algorithm 0.7%, control 0.7%, insul 0.7%

Focuses on effects of squeezing current.

Cluster 164,
Size: 42, ISim: 0.076, ESim: 0.006
Descriptive: featur 30.7%, extract 10.7%, featur.extract 4.2%, recognit 3.6%, textur 2.6%, imag 2.1%, fingerprint 2.1%, froth 1.4%, flotat 1.1%, audio 0.8%, gestur 0.7%, stereo 0.6%, new.featur 0.6%, detect 0.6%, paramet 0.6%
Discriminating: featur 18.2%, extract 6.1%, featur.extract 2.9%, sub 2.8%, recognit 2.0%, textur 1.5%, fingerprint 1.3%, system 1.3%, froth 1.0%, measur 0.9%, control 0.9%, model 0.8%, flotat 0.7%, sup 0.6%, temperatur 0.5%

Focuses on feature extraction from images and audio, such as texture, fingerprints, and froth found in coal mixtures.

Cluster 165,
Size: 30, ISim: 0.072, ESim: 0.003
Descriptive: beta 7.4%, synthesi 6.5%, catalyz 4.5%, alcohol 3.8%, yield 3.7%, addit 2.5%, alpha 2.4%, sulfat 2.0%, reaction 2.0%, total.synthesi 1.5%, step 1.4%, cycliz 1.4%, propyl 1.3%, palladium.catalyz 1.3%, trifluoromethyl 1.1%

Discriminating: beta 3.9%, synthesi 3.2%, catalyz 2.5%, sub 2.3%, alcohol 2.1%, yield 1.7%, system 1.7%, model 1.1%, sulfat 1.1%, alpha 1.1%, addit 0.9%, total.synthesi 0.9%, measur 0.8%, control 0.8%, algorithm 0.8%

Focuses on characteristics of reactions and synthesis involving alcohols and esters (primary denoted with the term “Beta.’

Cluster 166,
Size: 40, ISim: 0.074, ESim: 0.006
Descriptive: inform 41.2%, inform.system 9.6%, system 4.2%, share 1.0%, gp 0.8%, specif 0.8%, data 0.7%, inform.share 0.6%, share.inform 0.6%, articl 0.5%, standard 0.5%, design 0.5%, capp 0.5%, basi 0.4%, inform.model 0.4%
Discriminating: inform 24.2%, inform.system 6.4%, sub 2.8%, algorithm 0.9%, imag 0.8%, measur 0.8%, control 0.8%, sup 0.6%, share 0.6%, model 0.5%, gp 0.5%, simul 0.5%, temperatur 0.5%, sub.sub 0.5%, solut 0.5%

Focuses on elements of information systems such as sharing, specifications, data, standards, and design (CAPP System).

Cluster 167,
Size: 38, ISim: 0.072, ESim: 0.004
Descriptive: fluoresc 20.5%, dna 2.0%, naphthalimid 1.9%, donor 1.6%, bte 1.5%, electron.transfer 1.4%, molecular 1.4%, spectra 1.3%, bi 1.3%, thrombin 1.3%, beacon 1.3%, molecular.beacon 1.3%, aptam 1.3%, moieti 1.2%, compound 1.1%
Discriminating: fluoresc 12.2%, sub 2.1%, system 1.7%, naphthalimid 1.2%, dna 1.1%, model 1.0%, donor 1.0%, bte 0.9%, electron.transfer 0.9%, algorithm 0.8%, thrombin 0.8%, molecular.beacon 0.8%, beacon 0.8%, bi 0.8%, aptam 0.8%

Focuses on characterizing fluorescence spectra resulting from electron transfer primarily from naphthalimid (acid) donor compounds.

Cluster 168,
Size: 32, ISim: 0.073, ESim: 0.006
Descriptive: shell 15.5%, structur 7.7%, buckl 5.2%, pressur 2.6%, cylindr.shell 2.3%, doubl 2.0%, knit 1.8%, cylindr 1.7%, axial 1.5%, ring.plate 1.0%, axial.compress 1.0%, fill.cylindr 0.7%, fill.cylindr.shell 0.7%, cylindr.shell.axial 0.7%, shell.axial 0.7%
Discriminating: shell 9.9%, buckl 3.4%, sub 2.7%, structur 2.4%, system 1.6%, cylindr.shell 1.5%, knit 1.2%, cylindr 1.0%, doubl 1.0%, pressur 0.9%, algorithm 0.9%, imag 0.8%, axial 0.8%, control 0.8%, ring.plate 0.7%

Focuses on types of structural damage such as buckling and axial compression caused by pressures, primarily of cylinder shell structures. Possible applications include artillery shells.

Cluster 169,
Size: 34, ISim: 0.073, ESim: 0.006
Descriptive: network 20.3%, optim 5.7%, path 3.2%, rout 3.1%, algorithm 2.3%, capac 2.2%, constraint 1.4%, network.plan 1.2%, model 1.2%, path.bandwidth 1.1%, node 1.0%, restor 0.9%, hen 0.8%, railwai.network 0.8%, link 0.7%
Discriminating: network 9.7%, sub 2.3%, optim 2.2%, path 1.9%, rout 1.8%, system 1.6%, capac 1.2%, measur 1.1%, imag 0.9%, control 0.9%, network.plan 0.9%, path.bandwidth 0.8%, constraint 0.7%, hen 0.6%, railwai.network 0.6%

Focuses on network paths and optimization algorithms.

Cluster 170,
Size: 27, ISim: 0.072, ESim: 0.005
Descriptive: sub 10.8%, graph 6.7%, sub.graph 4.2%, coagul 2.0%, lambda 1.7%, remov 1.7%, sub.graph.match 1.6%, graph.match 1.6%, pile 1.6%, formula 1.6%, cod.sub 1.4%, wastewat 1.2%, cod 1.1%, lambda.sub 1.1%, dye.wastewat 1.1%
Discriminating: graph 3.9%, sub.graph 2.7%, system 1.4%, coagul 1.3%, sub 1.2%, graph.match 1.1%, sub.graph.match 1.1%, lambda 1.0%, model 1.0%, pile 1.0%, measur 1.0%, cod.sub 0.9%, imag 0.8%, remov 0.8%, algorithm 0.8%

Focuses on software sub-graph matching techniques, primarily used in wastewater removal applications and analysis.

Cluster 171,
Size: 32, ISim: 0.072, ESim: 0.006
Descriptive: load 25.9%, model 2.1%, pipe 1.9%, forecast 1.7%, load.model 1.1%, elast 1.0%, element 1.0%, tensil.creep 1.0%, intern 0.9%, intern.forc 0.9%, lagrangian 0.8%, plastic 0.8%, track.structur 0.8%, mechan 0.7%, tensil 0.7%
Discriminating: load 15.4%, sub 2.7%, system 1.5%, pipe 1.2%, control 0.9%, algorithm 0.9%, forecast 0.9%, imag 0.9%, load.model 0.8%, measur 0.7%, tensil.creep 0.7%, sup 0.6%, intern.forc 0.6%, lagrangian 0.5%, track.structur 0.5%

Focuses on modeling and forecasting of loading, primarily on pipes.

Cluster 172,
Size: 28, ISim: 0.072, ESim: 0.005

Descriptive: equat 11.5%, perturb 3.2%, fluid 2.2%, wave 2.1%, equat.state 2.0%, beam 1.3%, nonlinear 1.2%, deby 1.1%, model 1.0%, term 0.9%, kadomtsev 0.9%, solut 0.9%, layer.fluid 0.9%, deriv 0.9%, case 0.7%
Discriminating: equat 4.6%, sub 2.7%, perturb 1.9%, system 1.4%, equat.state 1.3%, fluid 1.1%, measur 1.0%, algorithm 0.9%, imag 0.8%, control 0.7%, deby 0.7%, paper 0.7%, wave 0.6%, kadomtsev 0.6%, layer.fluid 0.6%

Focuses on equations primarily associated with perturbations, fluid, wave, beam, nonlinear, and equations of state.

Cluster 173,
Size: 31, ISim: 0.070, ESim: 0.003

Descriptive: reaction 14.2%, keton 6.4%, alkyl 6.4%, yield 3.7%, aromat 3.6%, olefin 2.5%, substitut 2.0%, vinylphosphon 1.6%, synthes 1.4%, cyclopropan 1.3%, synthesi 1.3%, cycloaddit 1.2%, regioselect 1.2%, mild 1.1%, amin 1.0%
Discriminating: reaction 6.4%, keton 3.7%, alkyl 3.7%, sub 2.1%, aromat 2.0%, system 1.7%, yield 1.7%, olefin 1.5%, substitut 1.0%, model 0.9%, vinylphosphon 0.9%, algorithm 0.8%, cyclopropan 0.8%, imag 0.7%, cycloaddit 0.7%

Focuses on characteristics of reactions involving ketones, alkyls, aromatics, and olefins.

Cluster 174,
Size: 38, ISim: 0.072, ESim: 0.006
Descriptive: instrument 22.8%, virtual 8.5%, virtual.instrument 7.4%, system 3.4%, diagnosi 2.5%, softwar 1.9%, usb 1.4%, data 1.3%, dual 1.1%, function 0.9%, measur 0.9%, build 0.9%, driver 0.8%, monitor 0.7%, function.modul 0.6%
Discriminating: instrument 14.6%, virtual.instrument 5.1%, virtual 5.1%, sub 2.7%, diagnosi 1.4%, model 1.2%, usb 0.9%, imag 0.9%, algorithm 0.8%, softwar 0.8%, dual 0.6%, sup 0.6%, sub.sub 0.5%, driver 0.5%, solut 0.5%

Focuses on virtual instruments for measuring and diagnosis of systems and software.

Cluster 175,
Size: 28, ISim: 0.071, ESim: 0.005
Descriptive: rai 19.1%, electron 5.1%, hard.rai 3.5%, plasma 3.3%, diffract 2.1%, spin 1.6%, hard 1.5%, hot.electron 1.5%, polar 1.2%, crystallin 1.0%, crystal 0.9%, micro.electron 0.9%, rai.diffract 0.9%, scatter 0.7%, phase 0.7%
Discriminating: rai 10.6%, sub 2.4%, hard.rai 2.3%, electron 2.0%, system 2.0%, plasma 1.7%, model 1.2%, hot.electron 1.0%, diffract 0.9%, control 0.9%, algorithm 0.9%, spin 0.9%, hard 0.8%, imag 0.6%, paper 0.6%

Focuses on elements and properties of radiation (hard X-Rays & electrons) used to characterize items like plasmas and crystals.

Cluster 176,
Size: 72, ISim: 0.072, ESim: 0.006
Descriptive: film 55.5%, deposit 2.6%, substrat 1.2%, sputter 0.5%, temperatur 0.5%, sic 0.5%, peak 0.5%, rai 0.4%, surfac 0.4%, film.deposit 0.4%, crystal 0.4%, thick 0.3%, atom.forc 0.3%, atom 0.3%, diffract 0.3%
Discriminating: film 34.4%, system 1.9%, sub 1.8%, deposit 1.4%, model 1.1%, algorithm 0.9%, paper 0.7%, imag 0.6%, control 0.6%, substrat 0.6%, data 0.5%, new 0.5%, network 0.5%, simul 0.5%, sub.sub 0.5%

Focuses on characterization of different films.

Cluster 177,
Size: 31, ISim: 0.072, ESim: 0.006
Descriptive: data 20.4%, databas 10.4%, object 3.8%, model 3.0%, object.orient 2.8%, warehous 1.6%, orient 1.5%, data.warehous 1.4%, ado 1.2%, visual 0.8%, data.distribut 0.8%, schema 0.8%, landscap 0.8%, access 0.7%, clinic 0.7%
Discriminating: data 9.4%, databas 6.5%, sub 2.8%, object.orient 1.8%, object 1.7%, warehous 1.1%, measur 1.1%, data.warehous 0.9%, imag 0.9%, control 0.9%, algorithm 0.9%, ado 0.8%, orient 0.7%, system 0.7%, data.distribut 0.5%

Focuses on elements of databases (data warehouses & object oriented databases), such as models and data distribution.

Cluster 178,
Size: 26, ISim: 0.071, ESim: 0.005
Descriptive: commun 11.8%, mobil 5.5%, system 3.2%, mobil.commun 2.9%, autom 2.7%, intellig 2.1%, commun.system 2.0%, fieldbu 1.9%, default 1.8%, applic 1.7%, cdma 1.7%, wireless 1.6%, distribut.autom 1.4%, mobil.commun.system 1.3%, autom.system 1.3%
Discriminating: commun 6.8%, mobil 3.1%, sub 2.5%, mobil.commun 1.9%, autom 1.7%, commun.system 1.3%, fieldbu 1.3%, default 1.2%, cdma 1.0%, intellig 1.0%, measur 0.9%, distribut.autom 0.9%, algorithm 0.9%, wireless 0.9%, imag 0.8%

Focuses on mobile communication systems (automatic, wireless, cdma, and distribution).

Cluster 179,
Size: 65, ISim: 0.071, ESim: 0.006

Descriptive: beam 51.9%, propag 2.5%, gaussian 1.4%, beam.propag 1.4%, puls 1.3%, puls.beam 0.9%, gaussian.beam 0.8%, focal 0.7%, optic 0.6%, polar 0.5%, focus 0.5%, deriv 0.5%, laser 0.4%, intens 0.4%, paraxi 0.4%
Discriminating: beam 33.0%, sub 2.6%, propag 1.4%, system 1.2%, model 1.0%, beam.propag 1.0%, control 0.9%, gaussian 0.9%, measur 0.8%, algorithm 0.8%, imag 0.7%, puls.beam 0.6%, gaussian.beam 0.6%, data 0.5%, network 0.5%

Focuses on types of beams (e.g. Gaussian, pulse and laser) and their propagation characteristics.

Cluster 180,
Size: 51, ISim: 0.070, ESim: 0.005
Descriptive: particl 38.6%, nanoparticl 3.6%, size 3.3%, magnet 2.8%, particl.size 1.7%, spheric 1.6%, microspher 1.5%, diamet 1.2%, electron 0.7%, composit.particl 0.6%, metal 0.5%, morpholog 0.5%, reaction 0.5%, transmiss.electron 0.5%, tem 0.4%
Discriminating: particl 23.5%, nanoparticl 2.2%, sub 2.0%, system 1.8%, size 1.3%, model 1.2%, magnet 1.1%, particl.size 1.1%, microspher 1.0%, algorithm 0.9%, spheric 0.9%, control 0.8%, paper 0.7%, imag 0.7%, new 0.6%

Focuses on types of particles (e.g. nano, magnetic, composite, and microspheres).

Cluster 181,
Size: 35, ISim: 0.070, ESim: 0.006
Descriptive: reaction 26.9%, enzym 2.3%, electrod 2.1%, activ 1.7%, hydrolysi 1.4%, solvent 1.3%, kinet 1.1%, acid 1.1%, chemic 1.1%, pgme 1.0%, temperatur 0.9%, rate 0.9%, concentr 0.9%, degre 0.8%, reaction.temperatur 0.8%
Discriminating: reaction 15.5%, system 1.5%, enzym 1.5%, sub 1.3%, electrod 1.2%, measur 1.0%, algorithm 0.9%, hydrolysi 0.9%, imag 0.9%, model 0.8%, paper 0.7%, pgme 0.7%, solvent 0.6%, activ 0.6%, kinet 0.6%

Focuses on properties and characteristics associated with electro and chemical reactions (e.g. hydrolysis) of catalysts like enzymes.

Cluster 182,
Size: 30, ISim: 0.071, ESim: 0.006
Descriptive: sub 15.1%, oxid 8.6%, catalyst 7.6%, sub.sub 5.5%, tape 1.7%, sub.catalyst 1.6%, sub.sub.catalyst 1.3%, activ 1.1%, temperatur 1.0%, adsorpt 0.8%, green 0.6%, cpd 0.6%, lamin 0.5%, tile.bodi 0.5%, shape.memori 0.5%
Discriminating: oxid 4.8%, catalyst 4.5%, sub 2.6%, system 2.0%, sub.sub 1.7%, model 1.3%, tape 1.2%, sub.catalyst 1.1%, measur 1.1%, algorithm 1.0%, sub.sub.catalyst 0.9%, imag 0.9%, control 0.8%, paper 0.7%, time 0.6%

Focuses on catalysts, especially associated with oxidation/oxides.

Cluster 183,
Size: 39, ISim: 0.070, ESim: 0.006
Descriptive: shock 19.7%, vortex 7.2%, numer 6.5%, wave 5.5%, shock.wave 4.4%, flow 2.5%, explos 1.7%, model 1.3%, numer.simul 1.3%, numer.model 1.0%, dskaw 1.0%, cyclon 0.8%, swirl 0.8%, pressur 0.7%, flow.field 0.7%
Discriminating: shock 13.3%, vortex 4.8%, shock.wave 3.0%, numer 3.0%, sub 2.8%, wave 2.5%, system 2.1%, explos 0.9%, algorithm 0.9%, imag 0.9%, flow 0.8%, numer.simul 0.7%, dskaw 0.7%, control 0.7%, paper 0.6%

Focuses on characteristics of shock and vortexes (primarily from explosions and over pressures).

Cluster 184,
Size: 47, ISim: 0.069, ESim: 0.005
Descriptive: stress 45.4%, fractur 6.2%, shaft 1.2%, inclus 1.1%, stress.field 0.9%, calcul.stress 0.9%, field 0.7%, bridg 0.5%, strain 0.5%, situ.stress 0.4%, shaft.line 0.4%, elast 0.4%, failur 0.4%, stress.relax 0.4%, relax 0.3%
Discriminating: stress 27.7%, fractur 3.7%, sub 2.7%, system 1.8%, algorithm 0.9%, shaft 0.7%, imag 0.7%, inclus 0.6%, stress.field 0.6%, calcul.stress 0.6%, measur 0.6%, control 0.6%, sup 0.6%, time 0.5%, network 0.5%

Focuses on calculations of stress for fracture analysis and prediction (applied to mine shafts, bridges, etc.).

Cluster 185,
Size: 39, ISim: 0.071, ESim: 0.007
Descriptive: sub 14.7%, sup 5.5%, center.dot 4.0%, pbwo 3.9%, pbwo.sub 3.9%, dot 3.9%, center 3.9%, omega 2.0%, omega.sub 1.5%, yvo.sub 1.4%, yvo 1.4%, center.dot.sup 1.1%, dot.sup 1.1%, sub.omega 1.0%, laser 1.0%
Discriminating: pbwo 2.9%, pbwo.sub 2.9%, sub 2.6%, center.dot 2.6%, dot 2.5%, center 2.2%, system 2.0%, sup 1.6%, omega 1.3%, omega.sub 1.1%, model 1.1%, control 1.0%, yvo 1.0%, yvo.sub 1.0%, algorithm 0.9%

Focuses on grammatical constructs primarily annotated with the words “omega”, “center dot,” and “sub” (textual description to denote that a number as a subscript), primarily associated with characterization studies of crystals such as PbWO & YVO.

Cluster 186,
Size: 34, ISim: 0.070, ESim: 0.006

Descriptive: virtual 21.8%, assembl 7.6%, track 4.5%, system 2.2%, environ 2.1%, train 1.5%, walk 1.4%, human 1.3%, realiti 1.2%, platform 0.9%, virtual.realiti 0.9%, parallel 0.8%, mechan 0.7%, screw 0.7%, human.comput 0.6%
Discriminating: virtual 14.2%, assembl 4.8%, sub 2.7%, track 2.6%, environ 0.9%, walk 0.9%, measur 0.9%, realiti 0.8%, imag 0.8%, train 0.7%, human 0.7%, algorithm 0.6%, virtual.realiti 0.6%, sup 0.5%, temperatur 0.5%

Focuses on applications of virtual reality systems, such as assembly, tracking, and training.

Cluster 187,
Size: 70, ISim: 0.069, ESim: 0.006
Descriptive: finit.element 21.9%, finit 21.3%, element 15.8%, fem 1.5%, model 1.1%, field 0.9%, finit.element.model 0.9%, element.model 0.8%, variat 0.7%, mesh 0.6%, structur 0.6%, numer 0.5%, finit.element.fem 0.5%, element.fem 0.5%, design 0.4%
Discriminating: finit.element 15.1%, finit 13.8%, element 9.2%, sub 2.8%, system 1.5%, fem 0.9%, control 0.8%, measur 0.7%, imag 0.7%, algorithm 0.7%, finit.element.model 0.6%, sup 0.6%, element.model 0.6%, sub.sub 0.5%, time 0.5%

Focuses on applications of finite element modeling primarily applied to structure analysis.

Cluster 188,
Size: 44, ISim: 0.070, ESim: 0.007
Descriptive: imag 29.9%, segment 9.1%, contour 1.8%, background 1.8%, imag.segment 1.4%, contrast 1.3%, region 1.0%, automat 1.0%, threshold 0.9%, histogram 0.9%, detect 0.8%, extract 0.8%, grai 0.7%, inform 0.7%, blood 0.7%
Discriminating: imag 14.4%, segment 5.8%, sub 2.9%, contour 1.2%, system 1.2%, background 1.1%, imag.segment 1.0%, control 0.9%, model 0.8%, measur 0.8%, contrast 0.8%, histogram 0.6%, solut 0.6%, sup 0.5%, temperatur 0.5%

Focuses on image segmentation primarily for areas/regions.

Cluster 189,
Size: 48, ISim: 0.069, ESim: 0.005
Descriptive: irradi 11.8%, pb 6.5%, nanocryst 3.8%, room.temperatur 2.1%, room 2.1%, agi 2.1%, temperatur 1.7%, gamma.irradi 1.5%, tem 1.5%, size 1.4%, gamma 1.3%, morpholog 1.3%, product 1.3%, format 1.3%, nanoparticl 1.3%
Discriminating: irradi 7.2%, pb 4.3%, nanocryst 2.5%, system 1.7%, sub 1.6%, agi 1.4%, room.temperatur 1.2%, model 1.2%, room 1.2%, gamma.irradi 1.0%, algorithm 0.9%, tem 0.8%, measur 0.8%, sulfid 0.8%, gamma 0.7%

Focuses on the use of irradiation to fabricate nanocrystals.

Cluster 190,
Size: 104, ISim: 0.070, ESim: 0.007
Descriptive: imag 67.5%, process 1.1%, algorithm 0.9%, imag.process 0.8%, digit 0.7%, imag.imag 0.5%, digit.imag 0.5%, comput 0.4%, featur 0.4%, system 0.4%, detect 0.3%, inform 0.3%, imag.system 0.3%, infrar.imag 0.3%, restor 0.2%
Discriminating: imag 41.3%, sub 2.6%, system 0.9%, model 0.8%, measur 0.7%, control 0.7%, sup 0.6%, sub.sub 0.6%, solut 0.5%, structur 0.5%, imag.process 0.5%, temperatur 0.5%, network 0.4%, equat 0.4%, imag.imag 0.4%

Focuses on image processing.

Cluster 191,
Size: 39, ISim: 0.069, ESim: 0.006
Descriptive: magnet 17.7%, field 14.5%, magnet.field 6.8%, electr 2.8%, spin 2.7%, current 2.5%, kicker 1.6%, electr.field 1.4%, transistor 0.9%, beam 0.8%, turn 0.7%, polar 0.6%, emitt 0.6%, direct.field 0.5%, hl 0.5%
Discriminating: magnet 10.7%, field 7.2%, magnet.field 4.6%, sub 2.8%, spin 1.7%, electr 1.3%, system 1.2%, kicker 1.1%, model 1.1%, current 1.0%, electr.field 0.9%, imag 0.9%, algorithm 0.9%, transistor 0.6%, sup 0.5%

Focuses on characterizing magnetic and electric fields, primarily associated with small electronic devices.

Cluster 192,
Size: 30, ISim: 0.069, ESim: 0.006
Descriptive: control 13.6%, real.time 4.5%, time 4.5%, real 3.7%, traffic 3.1%, spc 1.9%, congest.control 1.4%, regul 1.4%, network 1.1%, congest 0.9%, ethernet 0.7%, cycl 0.7%, control.network 0.6%, system 0.6%, time.control 0.6%
Discriminating: control 4.8%, sub 2.9%, real.time 2.6%, traffic 1.9%, real 1.8%, spc 1.3%, congest.control 1.0%, time 1.0%, imag 0.9%, regul 0.8%, system 0.7%, algorithm 0.6%, congest 0.6%, solut 0.6%, sup 0.5%

Focuses on real-time control applications (traffic, networks, ethernet). Possible military applications include UAV control and tracking multiple small high speed objects.

Cluster 193,
Size: 44, ISim: 0.068, ESim: 0.006

Descriptive: voltag 38.8%, current 3.4%, modul 1.9%, charg 0.9%, charg.pump 0.9%, insul 0.8%, phase 0.7%, devic 0.6%, current.voltag 0.5%, ligbt 0.5%, suppli.voltag 0.5%, oper 0.5%, low.voltag 0.5%, power 0.5%, suppli 0.4%
Discriminating: voltag 24.6%, sub 2.7%, system 1.5%, current 1.4%, model 1.1%, algorithm 0.9%, imag 0.8%, modul 0.7%, charg.pump 0.6%, data 0.6%, solut 0.5%, measur 0.5%, network 0.5%, sub.sub 0.5%, control 0.5%

Focuses on elements of electronic devices/equipment, primarily voltage, and others such as current, phase, modulation, and charge.

Cluster 194,
Size: 27, ISim: 0.067, ESim: 0.005
Descriptive: dna 7.0%, ion 4.6%, charg 3.6%, endotoxin 3.6%, trap 3.6%, anion 3.2%, assai 3.1%, detect 2.1%, inject 1.3%, sampl 1.1%, charg.state 1.0%, linac 0.9%, concentr 0.9%, state 0.9%, rl 0.9%
Discriminating: dna 4.4%, sub 2.4%, endotoxin 2.4%, ion 2.3%, trap 2.2%, anion 2.0%, assai 2.0%, charg 2.0%, system 1.6%, model 1.3%, algorithm 0.9%, imag 0.8%, control 0.8%, inject 0.7%, charg.state 0.7%

Focuses on methods of detecting and assaying DNA, charges, and endotoxins.

Cluster 195,
Size: 34, ISim: 0.066, ESim: 0.005
Descriptive: properti 8.5%, rubber 7.2%, chemic 7.0%, mechan.properti 6.3%, mechan 3.9%, phr 1.9%, polyurethan 1.7%, surfac 1.3%, vulcaniz 1.1%, physic 1.0%, strength 1.0%, lignin 0.9%, carbon.black 0.9%, crosslink 0.8%, cell 0.7%
Discriminating: rubber 4.5%, mechan.properti 3.8%, chemic 3.5%, properti 3.4%, sub 2.4%, system 1.5%, phr 1.3%, model 1.2%, mechan 1.2%, polyurethan 1.1%, measur 0.9%, control 0.9%, algorithm 0.9%, imag 0.8%, vulcaniz 0.7%

Focuses on characterizing chemical and mechanical properties of rubber and polyurethane materials.

Cluster 196,
Size: 38, ISim: 0.066, ESim: 0.005
Descriptive: test 14.3%, strain 13.0%, stress 5.3%, life 3.4%, shpb 2.2%, concret 2.2%, fatigu 2.1%, stress.strain 1.6%, strain.rate 1.6%, specimen 1.5%, prestress 1.2%, weld 0.9%, bar 0.9%, strength 0.8%, load 0.8%
Discriminating: strain 7.7%, test 6.2%, sub 2.7%, stress 2.4%, life 2.1%, system 1.7%, shpb 1.5%, fatigu 1.3%, concret 1.2%, stress.strain 1.0%, strain.rate 1.0%, algorithm 0.9%, imag 0.8%, specimen 0.8%, prestress 0.8%

Focuses on testing of strain and stress fatigue and their rates on e.g. concrete & welds.

Cluster 197,
Size: 38, ISim: 0.065, ESim: 0.005
Descriptive: foam 8.6%, resin 3.2%, group 2.2%, polym 2.0%, hyperbranch 2.0%, alkyd 1.4%, cure 1.4%, nmr 1.3%, bond 1.2%, photoiniti 1.2%, molecular 1.1%, end.group 1.1%, ester 1.0%, poli 0.9%, synthes 0.8%
Discriminating: foam 5.5%, sub 2.2%, system 1.9%, resin 1.9%, hyperbranch 1.3%, model 1.1%, group 0.9%, alkyd 0.9%, algorithm 0.9%, control 0.9%, polym 0.8%, imag 0.8%, photoiniti 0.8%, cure 0.7%, paper 0.7%

Focuses on tings used in nanocomposites such as foams, resin, poly-based materials and hyperbranched structures.

Cluster 198,
Size: 61, ISim: 0.067, ESim: 0.006
Descriptive: network 56.6%, optic 0.8%, pipe.network 0.7%, reliabl 0.7%, secur 0.7%, network.secur 0.7%, protocol 0.6%, system 0.6%, model 0.6%, traffic 0.5%, paper 0.5%, switch 0.5%, atm 0.5%, intrus 0.5%, pipe 0.4%
Discriminating: network 33.6%, sub 2.8%, measur 1.0%, imag 0.8%, system 0.6%, algorithm 0.6%, control 0.6%, sup 0.5%, pipe.network 0.5%, temperatur 0.5%, sub.sub 0.5%, equat 0.5%, network.secur 0.5%, time 0.4%, new 0.4%

Focuses on network security, protocols, and reliability of e.g. optic switches.

Cluster 199,
Size: 42, ISim: 0.066, ESim: 0.006
Descriptive: softwar 37.9%, system 2.9%, softwar.system 1.7%, design 1.6%, tool 1.1%, object 0.9%, modul 0.9%, data 0.9%, draw 0.8%, autocad 0.7%, simul.softwar 0.7%, comput 0.6%, vba 0.6%, graphic 0.6%, visual 0.6%
Discriminating: softwar 24.6%, sub 2.8%, softwar.system 1.1%, algorithm 0.9%, model 0.9%, imag 0.8%, measur 0.6%, solut 0.5%, control 0.5%, sup 0.5%, sub.sub 0.5%, tool 0.5%, draw 0.5%, equat 0.5%, autocad 0.5%

Focuses on software systems, such as their design and tools.

Cluster 200,
Size: 38, ISim: 0.066, ESim: 0.006
Descriptive: algorithm 12.4%, graph 9.8%, layout 5.0%, placement 4.3%, tree 4.2%, rout 4.1%, parallel 1.5%, time 1.0%, span.tree 1.0%, mesh 1.0%, run 0.9%, constraint 0.7%, span 0.7%, polynomi 0.7%, connect 0.7%

__Discriminating:__ graph 6.3%, algorithm 4.1%, layout 3.4%, placement 3.0%, tree 2.6%, rout 2.5%, sub 2.4%, system 1.9%, measur 0.9%, imag 0.9%, control 0.9%, model 0.8%, span.tree 0.7%, parallel 0.6%, mesh 0.6%

Focuses on algorithm, graphs, layout, and placement.

Cluster 201,
Size: 71, ISim: 0.068, ESim: 0.008
__Descriptive:__ control 29.2%, control.system 24.3%, system 8.1%, simul 1.0%, model 0.6%, automat 0.6%, measur.control 0.5%, dynam 0.5%, bu 0.4%, oper 0.4%, measur.control.system 0.4%, coal 0.3%, loop 0.3%, test 0.3%, dc 0.3%
__Discriminating:__ control.system 18.6%, control 15.4%, sub 3.1%, system 1.1%, imag 1.0%, sup 0.7%, algorithm 0.7%, sub.sub 0.6%, solut 0.5%, structur 0.5%, measur 0.5%, equat 0.4%, surfac 0.4%, two 0.4%, function 0.4%

Focuses on control systems (e.g. simulated, measurement, and dynamic).

Cluster 202,
Size: 50, ISim: 0.066, ESim: 0.007
__Descriptive:__ hardwar 13.7%, softwar 13.2%, system 6.3%, design 3.9%, embed 3.3%, hardwar.softwar 2.6%, softwar.design 1.9%, platform 1.9%, data 1.7%, hardwar.structur 1.2%, control 1.0%, softwar.hardwar 0.9%, bluetooth 0.9%, system.hardwar 0.8%, record 0.7%
__Discriminating:__ hardwar 9.5%, softwar 8.2%, sub 2.3%, embed 2.1%, hardwar.softwar 1.9%, softwar.design 1.4%, model 1.1%, platform 1.1%, design 1.0%, algorithm 1.0%, imag 0.9%, hardwar.structur 0.9%, sup 0.6%, softwar.hardwar 0.6%, measur 0.6%

Focuses on hardware and software systems design.

Cluster 203,
Size: 41, ISim: 0.066, ESim: 0.006
__Descriptive:__ measur 18.0%, uncertainti 16.9%, interferomet 6.7%, optic 2.3%, fiber 2.2%, uncertainti.measur 2.0%, optic.fiber 1.5%, measur.uncertainti 1.0%, principl 0.7%, point 0.5%, formula 0.4%, thermal.diffus 0.4%, index 0.4%, formula.deduc 0.4%, profil 0.4%
__Discriminating:__ uncertainti 11.4%, measur 6.7%, interferomet 4.5%, sub 2.8%, uncertainti.measur 1.4%, model 1.1%, system 1.1%, optic.fiber 0.9%, algorithm 0.8%, control 0.8%, imag 0.8%, fiber 0.7%, measur.uncertainti 0.7%, optic 0.6%, solut 0.5%

Focuses on measuring uncertainties with interferometrics, and fiber optics.

Cluster 204,
Size: 49, ISim: 0.064, ESim: 0.005
Descriptive: water 27.5%, resourc 7.2%, water.resourc 4.3%, river 3.6%, climat 2.2%, china 1.7%, area 1.4%, wetland 1.3%, yellow 0.9%, lake 0.8%, data 0.8%, ecolog 0.8%, pollut 0.7%, fertil 0.7%, soil 0.7%
Discriminating: water 14.9%, resourc 4.1%, water.resourc 2.8%, sub 2.5%, river 2.2%, climat 1.4%, system 0.9%, wetland 0.8%, measur 0.8%, imag 0.7%, model 0.7%, algorithm 0.7%, yellow 0.6%, china 0.5%, lake 0.5%

Focuses on ecology effects on china water resources (rivers [Yellow River], wetlands, and lakes) from climate, pollution, and fertilizers.

Cluster 205,
Size: 47, ISim: 0.066, ESim: 0.006
Descriptive: signal 38.1%, frequenc 2.9%, domain 2.2%, channel 1.4%, time 1.0%, frequenc.domain 0.9%, demodul 0.9%, fault 0.9%, time.domain 0.8%, extract 0.8%, signal.gener 0.7%, coher 0.7%, denois 0.7%, photoacoust 0.7%, wavelet 0.6%
Discriminating: signal 22.5%, sub 2.9%, system 1.7%, domain 1.1%, frequenc 1.0%, control 0.9%, model 0.9%, imag 0.7%, sup 0.6%, frequenc.domain 0.6%, demodul 0.6%, channel 0.6%, solut 0.6%, sub.sub 0.5%, time.domain 0.5%

Focuses on signals, primarily their frequency & time domains.

Cluster 206,
Size: 53, ISim: 0.065, ESim: 0.006
Descriptive: heat 29.8%, heat.transfer 7.0%, transfer 5.9%, air 2.0%, water 1.9%, model 1.7%, solar 1.6%, honeycomb 1.6%, heat.pump 0.9%, temperatur 0.7%, steam 0.7%, geotherm 0.6%, thermal 0.6%, pressur 0.5%, flow 0.5%
Discriminating: heat 18.7%, heat.transfer 4.8%, transfer 3.3%, sub 2.5%, honeycomb 1.1%, solar 1.0%, system 1.0%, air 1.0%, imag 0.9%, algorithm 0.9%, measur 0.8%, control 0.7%, heat.pump 0.6%, sup 0.5%, water 0.5%

Focuses on heat transfer methods and modeling.

Cluster 207,
Size: 38, ISim: 0.065, ESim: 0.006
Descriptive: instrument 24.4%, measur 13.4%, measur.instrument 4.6%, photoelectr 2.0%, signal 0.9%, belt 0.8%, instrument.measur 0.7%, carrier 0.6%, monitor 0.6%, steel.cord 0.5%, cord.belt 0.5%, steel.cord.belt 0.5%, standard 0.5%, accuraci 0.5%, cord 0.5%

Discriminating: instrument 16.1%, measur 4.4%, measur.instrument 3.3%, sub 2.8%, photoelectr 1.4%, model 1.4%, system 1.3%, imag 0.9%, algorithm 0.8%, control 0.8%, network 0.5%, temperatur 0.5%, sub.sub 0.5%, solut 0.5%, belt 0.5%

Focuses on instruments for measuring/monitoring accuracies.

Cluster 208,
Size: 63, ISim: 0.062, ESim: 0.005
Descriptive: product 51.7%, market 1.8%, manufactur 1.3%, record 1.2%, cost 1.1%, capac 0.8%, demand 0.8%, product.line 0.7%, concurr 0.7%, econom 0.6%, benefit 0.6%, introduc 0.5%, product.model 0.5%, design 0.5%, cotton 0.5%
Discriminating: product 29.9%, sub 2.7%, system 1.1%, market 0.9%, measur 0.9%, algorithm 0.8%, control 0.8%, imag 0.8%, manufactur 0.6%, sup 0.6%, model 0.5%, time 0.5%, sub.sub 0.5%, network 0.5%, product.line 0.4%

Focuses on elements associated with production, such as marketing, manufacturing, cost, demand, capacity, design, economics, benefits, product lines, concurrance, and models.

Cluster 209,
Size: 26, ISim: 0.063, ESim: 0.006
Descriptive: system 10.7%, inspect 4.3%, test 4.0%, infrar 3.8%, whitewat 2.3%, pipelin 2.2%, data.system 2.0%, vehicl 1.1%, data 0.9%, optic 0.8%, detect 0.8%, apprais 0.7%, test.system 0.7%, mine 0.6%, pictur 0.6%
Discriminating: sub 2.9%, inspect 2.8%, infrar 2.3%, system 1.8%, whitewat 1.7%, pipelin 1.4%, data.system 1.4%, model 1.3%, test 1.1%, algorithm 1.0%, imag 0.7%, vehicl 0.6%, sup 0.6%, measur 0.6%, network 0.5%

Focuses on systems (e.g pipelines, data, and vehicles), methods of inspecting and testing them.

Cluster 210,
Size: 38, ISim: 0.061, ESim: 0.005
Descriptive: strength 22.8%, starch 4.7%, properti 2.8%, silk 2.3%, creep 2.2%, materi 1.9%, cement 1.7%, slurri 1.3%, mechan 1.2%, tail 1.1%, pozzolan 1.0%, steel 0.9%, phi 0.9%, surfac 0.8%, concret 0.7%
Discriminating: strength 13.3%, starch 3.0%, sub 2.1%, system 1.8%, silk 1.5%, creep 1.3%, model 1.1%, cement 1.0%, algorithm 0.9%, imag 0.8%, slurri 0.8%, control 0.8%, measur 0.8%, tail 0.7%, pozzolan 0.7%

Focuses on characterizing properties (primarily strength, creep, mechanical, and pozzolanic) of composites such as starch, silk, cement, slurries, and steel.

Cluster 211,
Size: 72, ISim: 0.063, ESim: 0.007
Descriptive: measur 27.8%, measur.system 18.6%, system 6.5%, laser 1.3%, precis 1.2%, system.measur 1.0%, measur.system.measur 0.8%, contact 0.8%, accuraci 0.7%, non.contact 0.6%, beam 0.6%, micro 0.5%, principl 0.5%, ccd 0.5%, posit 0.4%
Discriminating: measur.system 14.4%, measur 13.9%, sub 3.1%, algorithm 0.8%, model 0.8%, system.measur 0.7%, control 0.7%, sup 0.7%, imag 0.7%, measur.system.measur 0.6%, system 0.6%, sub.sub 0.6%, solut 0.6%, network 0.6%, time 0.5%

Focuses on measuring systems such as lasers and precision measurements.

Cluster 212,
Size: 31, ISim: 0.059, ESim: 0.005
Descriptive: core 4.1%, fuel 3.9%, pressur 3.4%, seal 2.4%, tunnel 2.1%, explos 1.9%, data 1.6%, ga 1.4%, experiment 1.2%, superson 1.0%, burn 1.0%, accid 1.0%, index 0.9%, depth 0.8%, vessel 0.8%
Discriminating: sub 2.6%, core 2.2%, fuel 2.2%, system 1.8%, seal 1.5%, pressur 1.3%, tunnel 1.1%, explos 1.0%, model 0.9%, control 0.9%, algorithm 0.9%, imag 0.8%, measur 0.7%, superson 0.7%, burn 0.6%

Focuses on key elements looked at for experimentation of nuclear power plants accidents such as core, fuels, pressure, seals, and explosions.

Cluster 213,
Size: 34, ISim: 0.060, ESim: 0.005
Descriptive: crystal 26.0%, zno 4.9%, format 4.2%, liquid.crystal 1.9%, liquid 1.8%, whisker 1.7%, zinc 1.5%, bicarbon 0.9%, glass 0.9%, morpholog 0.8%, hplc 0.8%, magnet 0.7%, hydrat 0.7%, powder 0.7%, peak 0.5%
Discriminating: crystal 14.9%, zno 3.1%, sub 2.4%, format 2.1%, system 1.8%, liquid.crystal 1.2%, whisker 1.1%, model 1.1%, zinc 0.9%, algorithm 0.9%, control 0.8%, liquid 0.8%, measur 0.7%, imag 0.7%, paper 0.7%

Focuses on characterizing the formation of zinc oxide and liquid crystals.

Cluster 214,
Size: 32, ISim: 0.060, ESim: 0.005
Descriptive: function 18.1%, graph 6.0%, set 4.0%, boolean.function 2.0%, scale.function 1.9%, polynomi 1.8%, interpol 1.7%, boolean 1.7%, nonlinear 1.4%, orthogon 1.0%, interpol.function 0.9%, posit.real 0.9%, case 0.8%, construct 0.8%, colour 0.8%

Discriminating: function 8.3%, graph 3.6%, sub 2.1%, system 1.9%, set 1.6%, boolean.function 1.4%, model 1.3%, scale.function 1.2%, boolean 1.1%, polynomi 1.0%, interpol 0.9%, control 0.9%, imag 0.7%, algorithm 0.7%, interpol.function 0.6%

Focuses on various mathematical functions and their elements used in combinatorial math (boolean, scaling, and interpolation functions).

Cluster 215,
Size: 75, ISim: 0.061, ESim: 0.006
Descriptive: laser 52.3%, pump 3.1%, diod 1.3%, caviti 0.9%, output 0.9%, beam 0.8%, power 0.8%, optic 0.8%, laser.beam 0.7%, amplifi 0.7%, wave 0.6%, laser.diod 0.5%, yag 0.5%, ghost 0.5%, yag.laser 0.4%
Discriminating: laser 33.6%, sub 2.8%, pump 1.8%, system 1.0%, algorithm 0.9%, diod 0.9%, control 0.8%, model 0.7%, imag 0.7%, measur 0.7%, paper 0.6%, network 0.5%, solut 0.5%, sub.sub 0.5%, laser.beam 0.5%

Focuses on types of lasers (pump, diode, beam, and optic).

Cluster 216,
Size: 35, ISim: 0.060, ESim: 0.005
Descriptive: materi 25.2%, composit 13.2%, surfac 1.9%, properti 1.2%, metal 1.0%, composit.materi 1.0%, cathod.materi 0.9%, cathod 0.9%, ferrit 0.9%, damp 0.6%, limit 0.6%, nano 0.6%, particl 0.5%, fine 0.5%, magnet 0.5%
Discriminating: materi 14.4%, composit 7.3%, sub 2.1%, system 2.1%, model 1.2%, measur 1.0%, control 1.0%, algorithm 1.0%, imag 0.9%, paper 0.7%, composit.materi 0.7%, cathod.materi 0.6%, cathod 0.6%, ferrit 0.6%, data 0.6%

Focuses on characterization of composite material properties.

Cluster 217,
Size: 37, ISim: 0.059, ESim: 0.006
Descriptive: photon 5.9%, optic 5.9%, aerosol 3.7%, wavelength 3.7%, correl 2.8%, ultrasound 2.1%, optic.element 1.8%, two.photon 1.6%, bar.code 1.5%, grate 1.4%, modul 1.3%, diffract 1.0%, scatter 1.0%, auto.correl 0.9%, doe 0.9%
Discriminating: photon 3.7%, sub 2.8%, aerosol 2.5%, optic 2.4%, wavelength 2.1%, correl 1.4%, model 1.4%, ultrasound 1.4%, optic.element 1.3%, system 1.2%, two.photon 1.1%, bar.code 1.0%, algorithm 0.9%, measur 0.8%, control 0.8%

Focuses on properties of elements that go thru optics such as photons (wavelength, diffraction, scatter) and aerosols.

Cluster 218,
Size: 45, ISim: 0.060, ESim: 0.006
Descriptive: cmo 10.4%, circuit 8.4%, power 3.9%, chip 3.5%, design 3.0%, clock 2.6%, architectur 1.7%, input 1.7%, microprocessor 1.2%, low.power 1.1%, cach 1.1%, bit 1.0%, logic 0.9%, unit 0.9%, low 0.8%
Discriminating: cmo 7.3%, circuit 4.7%, sub 2.9%, chip 2.2%, clock 1.8%, model 1.4%, power 1.2%, measur 1.0%, system 1.0%, imag 0.9%, input 0.9%, architectur 0.8%, microprocessor 0.8%, cach 0.8%, low.power 0.8%

Focuses on elements of CMOS, circuits and microprocessors architectures.

Cluster 219,
Size: 49, ISim: 0.058, ESim: 0.005
Descriptive: solut 36.9%, asymptot 3.7%, exist 2.6%, blow 1.4%, approxim 1.1%, approxim.solut 0.9%, asymptot.behavior 0.8%, gener.solut 0.8%, equat 0.7%, nonlinear 0.7%, initi 0.6%, program 0.5%, construct 0.5%, circular.plate 0.5%, behavior 0.5%
Discriminating: solut 19.0%, sub 2.7%, asymptot 2.2%, exist 1.2%, system 1.1%, measur 1.0%, blow 0.9%, control 0.9%, imag 0.9%, algorithm 0.8%, approxim.solut 0.6%, model 0.6%, structur 0.6%, asymptot.behavior 0.5%, gener.solut 0.5%

Focuses on solutions (primarily asymptotic) such as existence, approximate, general, nonlinear.

Cluster 220,
Size: 34, ISim: 0.059, ESim: 0.006
Descriptive: phase 7.3%, fring 5.5%, surfac 4.3%, measur 4.3%, pattern 2.3%, accuraci 1.4%, signal 1.4%, two 1.1%, fring.pattern 1.0%, caviti 1.0%, fourier.transform 0.9%, shift 0.9%, interferomet 0.9%, phase.shift 0.8%, fourier 0.8%
Discriminating: fring 3.9%, phase 3.2%, sub 3.0%, system 1.5%, surfac 1.4%, pattern 1.0%, control 0.9%, model 0.8%, fring.pattern 0.8%, imag 0.7%, sup 0.6%, paper 0.6%, phase.shift 0.6%, caviti 0.6%, measur 0.6%

Focuses on quantities such as phase, fringe patterns, and surfaces that can be measured for their interference errors.

Cluster 221,
Size: 46, ISim: 0.059, ESim: 0.006
Descriptive: optic 31.4%, light 3.4%, field.optic 1.5%, len 1.4%, storag 1.3%, polar 1.2%, field 1.1%, sil 0.8%, Cluster 0.7%, spectrum 0.6%, birefring 0.6%, magneto.optic 0.6%, solid.immers 0.6%, solid.immers.len 0.6%, immers.len 0.6%

Discriminating: optic 19.2%, sub 3.0%, light 1.7%, field.optic 1.1%, len 0.9%, algorithm 0.9%, system 0.9%, model 0.8%, storag 0.7%, imag 0.7%, polar 0.6%, sil 0.6%, solut 0.6%, sup 0.6%, measur 0.5%

Focuses on optic and optical properties solids.

Cluster 222,
Size: 29, ISim: 0.058, ESim: 0.005
Descriptive: formula 9.3%, forc 4.6%, movement 2.8%, calcul 2.6%, turn.mill 2.3%, calcul.formula 2.3%, garment 1.9%, mill 1.9%, rotat 1.9%, bodi 1.4%, hairpin 1.3%, liposom 1.2%, ag 1.2%, motion 1.2%, women 1.1%
Discriminating: formula 5.4%, sub 2.7%, forc 2.4%, system 1.8%, movement 1.7%, turn.mill 1.6%, calcul.formula 1.5%, garment 1.3%, mill 1.1%, rotat 1.0%, hairpin 0.9%, imag 0.9%, algorithm 0.8%, calcul 0.8%, liposom 0.8%

Focuses on formulas to calculate changes in body shapes due to force and movement.

Cluster 223,
Size: 41, ISim: 0.058, ESim: 0.005
Descriptive: oxid 13.2%, silicon 10.6%, substrat 3.7%, wafer 2.3%, oxygen 2.0%, layer 1.8%, surfac 1.3%, porou 1.1%, afm 0.8%, anneal 0.8%, crystal 0.8%, temperatur 0.8%, voltag 0.8%, sige 0.7%, fabric 0.7%
Discriminating: oxid 7.7%, silicon 6.8%, sub 2.5%, substrat 2.1%, system 2.1%, wafer 1.6%, model 1.1%, oxygen 1.0%, algorithm 0.9%, control 0.7%, paper 0.7%, porou 0.6%, data 0.6%, layer 0.5%, imag 0.5%

Focuses on properties of silicon and oxide materials used in substrates and wafers.

Cluster 224,
Size: 61, ISim: 0.058, ESim: 0.006
Descriptive: control 54.6%, control.control 1.8%, model 0.8%, system 0.8%, loop.control 0.7%, paper 0.6%, applic 0.6%, roll 0.5%, model.control 0.5%, tcsc 0.5%, control.model 0.4%, machin 0.4%, loop 0.3%, automat 0.3%, design 0.3%
Discriminating: control 30.1%, sub 3.0%, control.control 1.2%, imag 0.9%, measur 0.8%, algorithm 0.7%, sup 0.6%, system 0.6%, data 0.5%, sub.sub 0.5%, equat 0.5%, loop.control 0.5%, solut 0.5%, network 0.4%, new 0.4%

Focuses on non-real-time control applications (e.g. assessing control models & systems).

Cluster 225,

Size: 44, ISim: 0.056, ESim: 0.004

Descriptive: acid 15.4%, protein 10.1%, cell 7.4%, lignin 2.6%, concentr 2.2%, straw 1.7%, extract 1.2%, alkaloid 1.2%, iron 1.2%, cell.wall 1.1%, gallston 0.9%, fatti 0.9%, yield 0.8%, compon 0.7%, gfp 0.7%

Discriminating: acid 8.9%, protein 6.3%, cell 3.9%, sub 2.2%, system 1.7%, lignin 1.6%, model 1.1%, straw 1.1%, algorithm 0.9%, measur 0.9%, concentr 0.9%, control 0.8%, alkaloid 0.8%, imag 0.7%, paper 0.7%

Focuses on analyses of effects of acids, proteins, and lignans on cell walls, to include concentrations and extraction methods.

Cluster 226,

Size: 76, ISim: 0.056, ESim: 0.006

Descriptive: flow 50.8%, veloc 1.5%, vortex 1.4%, flow.field 1.3%, pump 1.0%, ga 0.9%, flow.rate 0.6%, phase.flow 0.6%, numer 0.6%, field 0.5%, model 0.5%, flowmet 0.5%, two.phase.flow 0.4%, pressur 0.4%, turbul 0.4%

Discriminating: flow 33.5%, sub 2.8%, system 1.4%, algorithm 1.0%, flow.field 0.9%, vortex 0.9%, control 0.8%, imag 0.8%, veloc 0.7%, sup 0.6%, new 0.6%, network 0.5%, sub.sub 0.5%, pump 0.5%, paper 0.5%

Focuses on methods of flow (rates & phase) analysis.

Cluster 227,

Size: 83, ISim: 0.057, ESim: 0.006

Descriptive: sensor 52.6%, measur 3.5%, circuit 0.8%, sensor.measur 0.7%, principl 0.7%, detect 0.6%, signal 0.5%, wavefront 0.5%, output 0.4%, displac 0.4%, accuraci 0.4%, test 0.4%, fiber 0.4%, dynam 0.4%, strain 0.3%

Discriminating: sensor 36.6%, sub 2.9%, system 1.2%, algorithm 1.0%, imag 1.0%, model 0.9%, sup 0.6%, sub.sub 0.6%, sensor.measur 0.5%, control 0.5%, network 0.5%, data 0.5%, solut 0.5%, equat 0.5%, function 0.4%

Focuses on sensor measurements.

Cluster 228,

Size: 36, ISim: 0.055, ESim: 0.005

Descriptive: net 7.9%, design 6.0%, petri 5.3%, fuze 3.3%, system 2.8%, petri.net 2.8%, model 2.5%, reliabl 2.1%, concurr 2.0%, integr.system 1.4%, net.model 1.0%, fuze.system 0.9%, asynchron 0.9%, asic 0.9%, convert 0.7%

Discriminating: net 5.1%, petri 3.7%, sub 2.6%, fuze 2.2%, petri.net 1.9%, design 1.8%, concurr 1.3%, integr.system 1.0%, reliabl 0.9%, algorithm 0.9%, imag 0.9%, measur 0.8%, net.model 0.7%, control 0.7%, fuze.system 0.7%

Focuses on net design, for example the Petri-Net Model (P-Net) used for system analysis & design.

Cluster 229,
Size: 60, ISim: 0.055, ESim: 0.006
Descriptive: sup 49.0%, ion 3.0%, sup.ion 1.9%, atom 0.9%, energi 0.6%, sup.sup 0.6%, activ 0.5%, beam 0.5%, state 0.5%, excit 0.4%, radioact 0.4%, gene 0.4%, zeolit 0.4%, chemic 0.4%, surfac 0.4%
Discriminating: sup 28.3%, sub 2.0%, system 2.0%, ion 1.6%, sup.ion 1.3%, algorithm 0.9%, imag 0.9%, measur 0.8%, paper 0.8%, model 0.8%, control 0.7%, network 0.5%, sub.sub 0.5%, design 0.5%, function 0.4%

Focuses on grammatical constructs annotated with the word "sup" (textual description to denote that a number as a superscript), but primarily measurable phenomena such as ionization & activation energies of atoms (i.e phenomena that are affected by actions).

Cluster 230,
Size: 43, ISim: 0.054, ESim: 0.006
Descriptive: fusion 10.2%, inform 9.5%, decis 5.3%, data 4.1%, robot 4.0%, locat 3.0%, sensor 2.2%, multi 1.8%, monitor 1.3%, data.fusion 1.3%, inform.fusion 1.3%, speech 0.9%, model 0.8%, system 0.8%, multisensor 0.7%
Discriminating: fusion 6.8%, inform 4.6%, decis 3.3%, sub 2.7%, robot 2.2%, locat 1.6%, data 1.0%, inform.fusion 0.9%, data.fusion 0.9%, imag 0.8%, sensor 0.7%, measur 0.6%, algorithm 0.6%, control 0.6%, multi 0.6%

Focuses on data fusion, its elements (information, decisions, data), systems (sensors), models, and applications (monitoring, locating, robotics, speech recognition).

Cluster 231,
Size: 38, ISim: 0.054, ESim: 0.005
Descriptive: chaotic 5.8%, invari 4.9%, chao 3.7%, system 3.6%, dynam 3.3%, poincar 1.8%, attractor 1.7%, birkhoffian 1.6%, perturb 1.6%, numer 1.6%, dimension 1.2%, map 1.2%, period 1.1%, topolog 1.1%, form.invari 1.1%
Discriminating: chaotic 3.8%, invari 3.2%, sub 2.5%, chao 2.4%, poincar 1.2%, birkhoffian 1.2%, attractor 1.1%, dynam 1.1%, measur 1.0%, perturb 0.9%, imag 0.9%, algorithm 0.9%, form.invari 0.8%, expon 0.7%, birkhoffian.system 0.6%

Focuses on chaotic theory (e.g. Poincare Map & Birkhoffian models).

Cluster 232,
Size: 50, ISim: 0.054, ESim: 0.006

Descriptive: algorithm 15.1%, fingerprint 5.3%, comput 4.1%, search 3.6%, optim 3.2%, match 2.6%, match.algorithm 1.7%, recognit 1.6%, fusion 1.6%, reduc.comput 1.4%, atr 1.1%, reduc 1.0%, parallel 0.9%, local 0.8%, comput.complex 0.8%
Discriminating: algorithm 5.8%, fingerprint 3.9%, sub 2.7%, search 2.3%, system 1.6%, comput 1.5%, match 1.4%, match.algorithm 1.3%, optim 1.1%, reduc.comput 1.1%, measur 1.0%, fusion 0.9%, control 0.9%, atr 0.8%, recognit 0.8%

Focuses on algorithms such as optimized matching algorithms, used in searching fingerprint databases.

Cluster 233,
Size: 53, ISim: 0.054, ESim: 0.006
Descriptive: equat 15.6%, solut 4.3%, dimension 4.1%, numer 3.1%, stoke 1.8%, stoke.equat 1.6%, scheme 1.6%, navier.stoke 1.3%, navier 1.3%, navier.stoke.equat 1.2%, three.dimension 1.0%, finit 0.9%, numer.solut 0.9%, flow 0.8%, cylind 0.8%
Discriminating: equat 7.6%, sub 3.0%, dimension 2.2%, system 1.5%, stoke 1.3%, stoke.equat 1.2%, numer 1.2%, measur 1.1%, solut 1.1%, navier.stoke 0.9%, navier 0.9%, navier.stoke.equat 0.9%, imag 0.8%, paper 0.7%, numer.solut 0.6%

Focuses on navier stokes equations and solutions used in turbulence flow analysis.

Cluster 234,
Size: 47, ISim: 0.053, ESim: 0.006
Descriptive: simul 23.4%, model 4.8%, simul.system 3.2%, system 3.1%, mathemat 2.2%, mathemat.model 1.3%, simul.model 1.3%, applic 1.1%, power.system 1.0%, basic.concept 0.9%, mpi 0.9%, fuze 0.9%, parallel 0.9%, power 0.8%, construct 0.8%
Discriminating: simul 12.8%, sub 2.9%, simul.system 2.4%, mathemat 1.1%, measur 1.0%, simul.model 0.9%, imag 0.8%, algorithm 0.8%, mpi 0.7%, control 0.7%, mathemat.model 0.7%, basic.concept 0.7%, fuze 0.6%, sup 0.6%, temperatur 0.6%

Focuses on modeling & simulation.

Cluster 235,
Size: 39, ISim: 0.051, ESim: 0.006
Descriptive: sub 15.6%, laser 7.9%, absorpt 2.3%, sub.laser 1.9%, jpe 1.7%, plasma 1.4%, ligand 1.2%, max 1.0%, sub.max 0.9%, fluoresc 0.8%, sub.theta 0.7%, theta 0.6%, lsb 0.6%, lsb.sub 0.6%, electrod 0.6%
Discriminating: laser 3.9%, sub 3.1%, system 2.2%, sub.laser 1.5%, jpe 1.3%, absorpt 1.3%, model 1.3%, algorithm 1.0%, control 0.8%, ligand 0.8%, imag 0.8%, measur 0.8%, plasma 0.8%, max 0.7%, paper 0.7%

Focuses on uses of lasers and plasmas to help extract or absorb elements.

Cluster 236,
Size: 60, ISim: 0.051, ESim: 0.007
Descriptive: imag 21.7%, camera 4.1%, match 4.0%, ccd 2.7%, scene 1.9%, object 1.8%, vision 1.7%, correct 1.6%, process 1.3%, imag.match 1.3%, system 1.0%, virtual 1.0%, measur 1.0%, real 0.9%, grid 0.8%
Discriminating: imag 10.7%, camera 3.1%, sub 3.1%, match 2.5%, ccd 1.9%, scene 1.4%, vision 1.2%, imag.match 1.0%, control 0.9%, correct 0.8%, object 0.8%, sup 0.7%, model 0.6%, sub.sub 0.6%, grid 0.5%

Focuses on image cameras and image matching for change detection analysis applications.

Cluster 237,
Size: 80, ISim: 0.050, ESim: 0.006
Descriptive: design 50.0%, system 2.1%, architectur 1.3%, robot 0.8%, product 0.8%, model 0.7%, compon 0.7%, system.design 0.6%, paper 0.6%, parallel 0.6%, platform 0.6%, framework 0.5%, object 0.4%, collabor.design 0.4%, design.design 0.4%
Discriminating: design 30.9%, sub 2.6%, measur 1.0%, imag 0.9%, control 0.7%, sup 0.6%, architectur 0.6%, algorithm 0.6%, temperatur 0.6%, sub.sub 0.5%, equat 0.5%, solut 0.4%, system.design 0.4%, surfac 0.4%, network 0.4%

Focuses on design, primarily that of systems and architectures.

Cluster 238,
Size: 119, ISim: 0.050, ESim: 0.006
Descriptive: algorithm 62.2%, vector 0.7%, comput 0.7%, algorithm.algorithm 0.6%, learn 0.6%, fast 0.6%, new 0.4%, aft 0.4%, paper 0.4%, signal 0.3%, imag 0.3%, process 0.3%, speed 0.3%, algorithm.comput 0.3%, rule 0.2%
Discriminating: algorithm 38.4%, sub 3.1%, system 1.3%, measur 1.0%, model 0.9%, control 0.8%, sub.sub 0.6%, solut 0.6%, temperatur 0.5%, structur 0.5%, algorithm.algorithm 0.5%, equat 0.5%, sup 0.4%, surfac 0.4%, design 0.4%

Focuses on algorithms such as vector, computation, and learning.

Cluster 239,
Size: 66, ISim: 0.050, ESim: 0.006
Descriptive: algorithm 36.0%, new.algorithm 5.9%, converg 3.0%, new 2.9%, estim 1.7%, iter 1.7%, sort 1.3%, error 1.1%, paper.new 0.5%, model 0.5%, bin 0.4%, linear 0.4%, simul 0.4%, paramet 0.4%, paper 0.4%

Discriminating: algorithm 19.1%, new.algorithm 4.4%, sub 2.7%, converg 1.7%, system 1.7%, measur 1.0%, iter 1.0%, sort 1.0%, estim 1.0%, imag 0.7%, control 0.7%, solut 0.6%, sub.sub 0.6%, sup 0.5%, equat 0.5%

Focuses on algorithms (new & convergence) primarily used for estimation.

Cluster 240,
Size: 48, ISim: 0.049, ESim: 0.006
Descriptive: frequenc 12.3%, reson 8.9%, wave 4.5%, caviti 3.2%, reson.frequenc 2.9%, scatter 1.7%, coupl 1.4%, nois 1.1%, imped 1.0%, modul 0.9%, mode 0.7%, vibrat 0.7%, sourc 0.7%, stand 0.7%, elast 0.7%
Discriminating: frequenc 6.6%, reson 5.8%, sub 2.8%, reson.frequenc 2.1%, wave 2.1%, caviti 2.1%, system 1.3%, algorithm 1.0%, control 0.9%, scatter 0.9%, imag 0.7%, sup 0.6%, measur 0.6%, coupl 0.6%, model 0.6%

Focuses on applications and characterization of resonance frequency and wave analysis.

Cluster 241,
Size: 61, ISim: 0.047, ESim: 0.004
Descriptive: china 39.8%, year 2.7%, technolog 1.9%, countri 1.2%, advanc 1.2%, scienc 1.0%, paper 0.9%, applic 0.8%, bauxit 0.7%, product 0.7%, introduc 0.7%, summar 0.6%, batteri 0.5%, logist 0.5%, develop 0.5%
Discriminating: china 24.0%, sub 2.5%, system 1.5%, year 1.5%, technolog 1.0%, algorithm 0.9%, measur 0.9%, model 0.8%, imag 0.8%, control 0.8%, countri 0.8%, advanc 0.6%, sup 0.5%, data 0.5%, time 0.5%

Focuses on elements of transportation (urban, country) in China, such as traffic, safety studies, roads, plans, and demand.

Cluster 242,
Size: 39, ISim: 0.048, ESim: 0.005
Descriptive: rocket 8.6%, bear 5.7%, wave 5.6%, motor 4.5%, projectil 2.5%, thrust 1.8%, structur 1.2%, layer 1.1%, veloc 1.0%, acceler 0.9%, materi 0.8%, rocket.motor 0.8%, ultrason 0.7%, helix 0.6%, section 0.6%
Discriminating: rocket 6.2%, bear 3.8%, motor 3.0%, sub 2.9%, wave 2.6%, projectil 1.7%, system 1.3%, thrust 1.3%, algorithm 1.0%, measur 0.9%, imag 0.8%, control 0.6%, sup 0.6%, rocket.motor 0.6%, time 0.6%

Focuses on items (e.g. rocket motors, thrust, acceleration, ultrasonics) that produce waves causing damage and/or requiring compensation to structures and materials.

Cluster 243,
Size: 37, ISim: 0.048, ESim: 0.006
Descriptive: machin 14.0%, oper 6.1%, system 4.6%, paper 3.8%, part 2.6%, machin.system 1.4%, postal 1.3%, gener 1.0%, precis 1.0%, straighten 1.0%, evacu 1.0%, seek 0.9%, machin.tool 0.8%, burr 0.8%, biomateri 0.8%
Discriminating: machin 9.0%, sub 3.0%, oper 2.7%, part 1.3%, machin.system 1.0%, postal 1.0%, imag 0.8%, algorithm 0.8%, straighten 0.7%, evacu 0.7%, sup 0.6%, control 0.6%, seek 0.6%, machin.tool 0.6%, burr 0.6%

Focuses on applications of machine system operations.

Cluster 244,
Size: 47, ISim: 0.048, ESim: 0.006
Descriptive: acceleromet 12.1%, compens 6.1%, voltag 2.9%, capacit 2.8%, measur 2.6%, test 2.2%, circuit 2.1%, micro 1.2%, rocket 1.1%, sensit 1.0%, frequenc 0.9%, high 0.9%, linear 0.8%, precis 0.8%, vibrat 0.8%

Discriminating: acceleromet 9.5%, compens 4.2%, sub 3.2%, capacit 2.0%, system 1.5%, voltag 1.5%, algorithm 1.1%, imag 1.0%, circuit 0.8%, rocket 0.8%, control 0.7%, model 0.7%, micro 0.7%, sub.sub 0.6%, solut 0.6%

Focuses on precision measurements and testing (using accelerometers) for compensation. Possible applications with rockets and microcircuits.

Cluster 245,
Size: 78, ISim: 0.046, ESim: 0.007
Descriptive: error 26.6%, measur 10.3%, precis 4.6%, accuraci 2.7%, posit 2.5%, probe 1.3%, system 0.9%, error.measur 0.8%, motion 0.7%, estim 0.7%, posit.error 0.6%, micromet 0.6%, round.error 0.6%, principl 0.5%, test 0.5%
Discriminating: error 18.7%, measur 3.5%, sub 3.1%, precis 2.8%, accuraci 1.4%, posit 1.1%, algorithm 1.1%, model 0.9%, probe 0.8%, sup 0.7%, control 0.7%, error.measur 0.6%, sub.sub 0.6%, network 0.6%, equat 0.6%

Focuses on precision measurements to reduce measuring errors.

Cluster 246,
Size: 67, ISim: 0.045, ESim: 0.006
Descriptive: temperatur 35.1%, heat 3.8%, degre 2.7%, dry 2.3%, low.temperatur 1.6%, high.temperatur 1.6%, cool 1.1%, transit 0.9%, low 0.8%, thermal 0.8%, materi 0.7%, breakdown 0.6%, ga 0.6%, rate 0.5%, high 0.5%
Discriminating: temperatur 20.8%, sub 2.3%, system 2.0%, heat 1.8%, dry 1.5%, low.temperatur 1.1%, high.temperatur 1.1%, algorithm 1.0%, degre 1.0%, imag 0.9%, model 0.9%, control 0.9%, paper 0.8%, cool 0.7%, data 0.5%

Focuses on elements of temperature such as heat, degree, rates, and high/low thresholds.

Cluster 247,
Size: 51, ISim: 0.045, ESim: 0.006
Descriptive: equat 26.6%, matrix 1.6%, boundari 1.5%, solv 1.3%, integr.equat 1.2%, implicit 1.2%, nonlinear 1.2%, deriv 0.8%, solut 0.8%, linear 0.7%, potenti 0.7%, constrict 0.6%, dynam.equat 0.6%, non 0.6%, boundari.integr.equat 0.6%
Discriminating: equat 15.2%, sub 3.1%, system 1.2%, measur 1.0%, imag 1.0%, control 0.9%, implicit 0.9%, integr.equat 0.8%, solv 0.8%, matrix 0.7%, sup 0.7%, boundari 0.6%, model 0.6%, sub.sub 0.6%, time 0.5%

Focuses on equations, primarily associated with matrices, boundaries, and nonlinear.

Cluster 248,
Size: 44, ISim: 0.044, ESim: 0.006
Descriptive: carlo 4.7%, mont 4.6%, mont.carlo 4.0%, distribut 3.0%, model 2.4%, mean.field 1.9%, simul 1.6%, surfac 1.4%, carlo.simul 1.3%, mont.carlo.simul 1.3%, densiti 1.3%, transport 1.2%, paramet 1.2%, mean 1.2%, mean.field.theori 1.0%
Discriminating: carlo 3.6%, mont 3.5%, sub 3.0%, mont.carlo 3.0%, system 1.6%, mean.field 1.5%, control 1.0%, imag 1.0%, carlo.simul 1.0%, mont.carlo.simul 1.0%, distribut 1.0%, algorithm 0.9%, measur 0.9%, mean.field.theori 0.8%, transport 0.7%

Focuses on elements of monte carlo simulations, such as random samples for probablistic/statistical calculations.

Cluster 249,
Size: 51, ISim: 0.044, ESim: 0.007
Descriptive: sub 25.5%, delta 3.3%, crack 2.1%, delta.sub 1.5%, pressur 0.9%, coal 0.8%, piezoelectr.materi 0.8%, element 0.5%, sampl 0.5%, photosynthesi 0.5%, fractal 0.5%, creep 0.5%, sub.infin 0.5%, area 0.4%, loss 0.4%
Discriminating: sub 8.3%, delta 2.4%, system 2.3%, crack 1.3%, delta.sub 1.2%, algorithm 1.2%, imag 1.1%, model 0.9%, control 0.7%, paper 0.6%, piezoelectr.materi 0.6%, design 0.6%, sup 0.5%, new 0.5%, structur 0.5%

Focuses on characterization of delta's (changes) of phenomena such as cracks, pressure, and creep in materials (e.g. piezoelectric materials).

Cluster 250,
Size: 59, ISim: 0.043, ESim: 0.007

Descriptive: system 9.7%, bu 3.6%, modul 3.2%, devic 2.6%, speed 2.3%, channel 2.2%, high 1.9%, circuit 1.8%, pci 1.6%, data 1.6%, signal 1.5%, design 1.5%, high.speed 1.2%, fpga 1.1%, mpeg 1.1%
Discriminating: sub 3.4%, bu 2.8%, modul 1.8%, system 1.7%, model 1.5%, devic 1.4%, pci 1.4%, channel 1.2%, speed 1.1%, imag 0.9%, mpeg 0.9%, fpga 0.9%, cdma 0.8%, high.speed 0.8%, algorithm 0.8%

Focuses on elements of a system controlled by power (e.g. buses, modules, devices).

Cluster 251,
Size: 92, ISim: 0.042, ESim: 0.007
Descriptive: sub 53.6%, reaction 0.6%, maa.sub 0.5%, sub.sub 0.5%, temperatur 0.5%, beta 0.5%, phase 0.5%, water 0.5%, maa 0.5%, molecular 0.4%, polymer 0.3%, surfac 0.3%, compound 0.3%, structur 0.3%, alloi 0.3%
Discriminating: sub 27.9%, system 2.1%, model 1.1%, imag 1.1%, algorithm 0.9%, paper 0.8%, control 0.7%, measur 0.7%, network 0.6%, design 0.6%, data 0.6%, equat 0.5%, maa.sub 0.5%, function 0.5%, signal 0.5%

Focuses on reaction properties of compounds.

Cluster 252,
Size: 49, ISim: 0.041, ESim: 0.006
Descriptive: model 21.0%, system 8.3%, brush 1.1%, amsaa 1.0%, amsaa.bise 0.7%, bise 0.7%, concept 0.7%, inositol 0.7%, optim 0.6%, queue.model 0.6%, characterist 0.6%, railwai 0.6%, nutrient 0.6%, structur 0.6%, cosmo 0.6%
Discriminating: model 8.6%, sub 3.0%, measur 1.2%, system 1.1%, imag 1.0%, brush 0.9%, control 0.8%, amsaa 0.8%, algorithm 0.8%, sup 0.6%, amsaa.bise 0.6%, bise 0.6%, sub.sub 0.6%, equat 0.5%, two 0.5%

Focuses on modeling systems such as AMSAA-BISE growth model for multiple systems.

Cluster 253,
Size: 90, ISim: 0.038, ESim: 0.006
Descriptive: measur 46.8%, test 0.8%, system 0.8%, machin 0.7%, circuit 0.7%, principl 0.7%, displac 0.6%, new 0.5%, veloc 0.4%, accuraci 0.4%, high 0.4%, paramet 0.4%, explos 0.3%, piv 0.3%, time 0.3%
Discriminating: measur 28.4%, sub 3.4%, algorithm 1.1%, imag 1.0%, control 0.9%, model 0.9%, sup 0.7%, sub.sub 0.6%, system 0.6%, solut 0.5%, structur 0.5%, network 0.5%, design 0.4%, equat 0.4%, distribut 0.3%

Focuses on measurements.

Cluster 254,
Size: 61, ISim: 0.037, ESim: 0.006
Descriptive: model 17.7%, simul 8.4%, mathemat.model 2.9%, mathemat 2.5%, experiment 1.1%, fractal 1.0%, test 1.0%, numer 1.0%, thermal 0.9%, model.simul 0.8%, experi 0.7%, droplet 0.7%, car 0.7%, set 0.6%, data 0.6%
Discriminating: model 6.9%, simul 3.6%, sub 3.3%, mathemat.model 1.9%, mathemat 1.4%, system 1.4%, imag 1.1%, algorithm 1.0%, control 1.0%, measur 0.6%, network 0.6%, sub.sub 0.6%, solut 0.6%, model.simul 0.6%, design 0.6%

Focuses on math modeling & flow simulation.

Cluster 255,
Size: 54, ISim: 0.036, ESim: 0.006
Descriptive: calcul 11.4%, energi 3.1%, test 2.7%, theori 2.3%, basi 2.0%, dynam 1.8%, paramet 1.7%, consumpt 1.4%, pss 1.3%, model 1.3%, point 1.3%, engin 1.2%, curv 1.0%, energi.consumpt 1.0%, theoret 0.8%
Discriminating: calcul 6.8%, sub 3.2%, energi 1.3%, system 1.1%, pss 1.1%, imag 1.0%, basi 0.9%, consumpt 0.9%, measur 0.9%, control 0.9%, energi.consumpt 0.8%, engin 0.8%, algorithm 0.7%, theori 0.7%, piston 0.6%

Focuses on calculations, applied to energy, theory, dynamics, and models.

Table A10C-1. Base Clusters of Cluto 256-Cluster Analysis (EC 2000-2003)

Based On ==>		CLUTO
DATA SOURCE ==>		ENG COMPENDEX
# ITEMS ==>		256 CLUSTERS
CLUSTER #	# RECORDS	**DESCRIPTION**
0	27	imaging watermarks (embedding & detecting).
1	11	surface flashover phenomena & trap distribution associated with alumina ceramics for insulators.
2	23	characteristics associated with fluidization studies of beds, separation, coal, mediums, jig, densities.
3	15	GIS (Geographic Information Systems) example uses for mapping of geothermal resources.
4	16	nanowires.
5	17	studies predicting outbursts of rocks (coal) & gases (methane) by monitoring Electromagnetic Emissions/Radiation (EME/EMR).
6	15	deformation of bolts and anchoring them to rocks & trusses (applications - mines & bridges).
7	132	properties of compounds such as crystals and glass, such as temperature, magnetic, superconductivity and structures.
8	16	supply chain manufacturing (scm) and enterprising.
9	13	characterizing the effects of nucleation on the crystalization behavior of polymer

		materials such as polypropylene (PP) and polyoxymethylene (POM).
10	23	support of roofs in mines (coal) and caves.
11	31	solutions related to position, such as existence, boundaries, and nonlinear solutions.
12	23	carbon nanotubes.
13	26	artificial neural networks (ANN).
14	15	loading on gears and gear teeth.
15	22	characterizing flame retardants and thermal degradation.
16	20	things (non-mechanical) such as magnetic fields that cause changes in properties of materials (e.g. MnO).
17	20	adsorption, adsorbtion, and desorption properties of dyes and tea.
18	29	primary properties used to characterize copolymers such as molecular weight distribution.
19	23	radial basis function (rbf) and neural networks.
20	21	wavelet packet transform.
21	34	studies of types of nanocomposites such as clay, Montmorillonite [MMT], and graphite oxides.
22	30	synthetic aperature radar (SAR) imaging.
23	15	blind signature schemes in cryptographic communications.
24	19	wavelet transforms applied tp edge detection.
25	23	deinking of pulp and newsprint applied to papermaking process (the process of deconvolving discrete states).
26	29	differential equations such as impulse, oscillatory, and 2nd-order equations.
27	33	content & object-based image retrieval techniques.
28	28	edge detection imaging techniques.
29	19	types of image encoding and decoding techniques such as compression and fractals.
30	20	blasting and its effects on the strata movement of structures in mines.
31	30	bending moments to ship hulls and girders.
32	22	mapping of inequality spaces such as multivalue, multivariant, and Banach Spaces.
33	18	elements of algebra such as Lowen functors and Lie-algebra that are used in mapping and joining of subspace lattices.
34	50	entangled (or mixed) states of elements that can be decomposed from systems such as quantum states of atoms and photons.
35	35	elements of the web/internet.
36	25	image reconstruction used in fields like tomography and holography.
37	40	elements of enterprises, such as virtual, coal, marketing, partners, competition, cooperation, benefits, knowledge, innovation, and economics.
38	26	aspects related to trains, such as railways, cargo (freight, passenger), optimization, and speed.
39	39	aspects related to oscillation such as delay difference equations, criteria, and conditions.

40	23	elements of transportation (urban, country) in China, such as traffic, safety studies, roads, plan, and demand.
41	53	periodic solutions, such as existence, theorem, coincident, and nonlinear periodic solutions.
42	21	methods for establishing bounds (such as Drazin inverse, upper, and lower) of linear things.
43	25	settlements of soils (ground, piles, foundations, water, sea, frost/frozen soil).
44	26	segmentation imaging primarily associated with lines, such as palmprints & handwritting identification.
45	26	damage from cracks and fatigue.
46	31	mechanics, kinetics, and properties of preparing blends like epoxys & resins of poly-based materials (e.g. curing, crosslinking).
47	19	characterizing the thermal conductivity of shape stabilized Phase Change Materials (PCM's) such as paraffin.
48	25	intelligent control systems.
49	25	Methods of applying coatings to larger things such as grains, bones, and alloys (e.g. arc-spraying & implantation).
50	29	image pattern recognition primarily associated with facial recognition (biometrics).
51	34	Multimode Network Theory applied to dielectric & millimeter antenna wave guides.
52	26	types of error measurements (caused by interference) such as angle, error, diffraction, Moire.
53	31	encoding and decoding (turbo-code, Reed-Solomon codes, CDMA).
54	50	pulp and bleach as applied to the papermaking process. Representative of specific elements used in decomposing.
55	22	imaging tissue using tomographic imaging, ultrasound, and photoacoustic techniques.
56	30	elements affecting land cover, such as vegetation, oasis (Kenya), desertification, arid, and ecology.
57	38	equations and soliton solutions (e.g. waves, exact, and nonlinear solutions).
58	30	error measurement calibration.
59	26	types of drive, such as systems, motors (reluctance & induction), and controls.
60	35	property studies of SiO & TiO (rutile) substance coatings.
61	32	image compression techniques, primarily wavelets, and coder, coefficient matching.
62	41	things annotated with the words “times” (meaning multiplication) & “sup” (textual description to denote that a number as a superscript), that are primarily associated with MOLs in chemical concentration formulas.
63	38	neural network methods used in expert systems fault diagnositics.

64	18	properties of lasers & fiber optic materials, such as birefringence (light refraction in an anisotropic material) and polycyclic aromatic hydrocarbons (PAHs).
65	20	scheduling of coal plants, production, and machines. Operating characteristics & things to enable the use of these systems.
66	34	methods to improve the gain of fiber optics (i.e. pumping, raman amplifiers, doping, and reducing dispersion).
67	24	types of micro antennas (Patch & Microstrip) and micromachining techniques.
68	20	methods for establishing bounds of non-linear things, e.g. Bezier curve, and weakest bound electron potentials.
69	25	mechanical properties of ceramics such as sintering, and powder lubrication.
70	22	studies for advancing China's coal mining capacity (New 5yr Plan), such as identifying coal resources, systems (flotation, crushing, machines), and economics.
71	42	characterization of thin films.
72	28	characterizing the ignition & spread of fire.
73	46	things annotated with the words BETA & SUP (textual description to denote that a number as a superscript), primarily associated with characterization studies of ion-doped materials using laser pumps (i.e. things that cause action).
74	24	types of millimeter wave guides (e.g. Helical-grooved).
75	31	characterizing combustion properties, such as heat release and burn rates.
76	26	analyses and effects on membranes associated with blood & cell studies, and biosensors.
77	77	the wear of surfaces of composites and steel, primarily from friction.
78	24	digital signal processing for applications with voice, fpga, and high-speed processes.
79	22	chains, (primarily polymer and molecular chains) and things associated with them such as adsorption, solvents, and coils (their shapes).
80	25	corba servers, clients, architectures (applications) related to the internet.
81	37	aspects associated with elliptical solutions such as semilinear equations, existence, and uniqueness.
82	34	methods of deposition on smaller things such as diamond films, filaments, and substrates (e.g. chemical vapor depostion).
83	30	security, such as protocols against attack(er) and public keying for authentication.
84	56	strength and fracture characteristics of rock masses (for use in mining applications).
85	40	crystal formation and morphology.
86	25	structural heat transfer mechanisms such as tubes and fins.

87	23	associations with gas and accumulating it, such as fields (reservoirs, basins), Jurassic periods, coal, and geochemistry.
88	53	multi-agent systems.
89	28	things associated with nuclear power plants and reactors, such as fuel cycles, accidents, and design.
90	26	elements of a market, such as contracts, risk, stocks, generation, customs, schedules, transactions, and transmission. Note, taxonomy similiar in electric & stock markets, but emphasis is on power generation.
91	81	nanorods.
92	45	methods of growing films and depositing them on substrates.
93	39	things associated with stabilization analysis (e.g. system stability, asymptotic stability, time delays).
94	31	quantum states of hyperspheres, systems, orbits, and quantum key distribution (qkd). Note, these are representative of things that can be decomposed into discrete states.
95	77	things annotated with the words SUP & SUB (textual descriptions to denote that numbers as subscripts & superscripts), primarily associated with the characterization of states/transition states of elements (e.g. ions/ionization).
96	30	chaos theory used in bifurcation, stocastic, and non-linear problems.
97	64	genetic algorithms.
98	21	characterizing the thermal conductivity of electrolyte composite materials during explosions.
99	23	major project elements associated with safety from accidents, fire, hydropower construction (eg. Three Gorges Project), economics, and capital.
100	22	oil uses (lubrication, desalting, petrochemical industry - organic), contents, extraction, and types (crude, tea).
101	22	things that cause landslides, such as earthquakes, tectonic shifts, slope, and drilling.
102	37	mechanisms of knowledge based systems (Cased-Based Reasoning, Rule-Based Reasoning).
103	38	Feedback Control Systems (chaotic, non-linear, closed loop).
104	30	things that rely on sufficient conditions, such as systems stability & control systems.
105	46	study of coal gasification in mines, underground and seams.
106	25	properties of reactors primarily associated with chloration and dechlorination processes used to remove pollutants from water/liquids. Representative of liquid reactions.
107	32	elements of bids/bidding (eg. power generation), such as price/cost, unit, market, reserve, constraints, and margins.
108	31	characterization of glass, such as phosphate glass and glass beads.
109	21	elements of encoding/decoding to be compressed (e.g. bits, video, code).

110	23	types of circuits (e.g. arc-discharging, models).
111	23	things to enable the use of systems, such as transactions, workflow, and cooperation.
112	66	fuzzy neural network theory.
113	43	principles of catalysts and catalytic processes/materials.
114	51	control system algorithms (Fuzzy Control, Proportional Integral Derivative [PID] Control).
115	49	characterizing the microstructure properties of alloys, such as shape memory effect (SME), bonding, and strength.
116	23	sustaining the ecology/environment of forests and soils due to mining.
117	22	fatigue damage (corrosion & cracks), primarily to stainless steel from tritium. Applications to nuclear power reactors.
118	30	elements and properties of dielectric waveguides.
119	32	theorems used in mapping spaces (existance, fix-point).
120	25	detecting objects, contours, & motion in video and color images.
121	22	studies of neutron flux density behaviors in different mediums.
122	43	mobile networks (wireless), protocols, and quality of service.
123	75	wavelet transform used in signal detection and frequency & time applications (primarily non-imagery).
124	29	strain and strain rate of materials, steel, and walls (also shear stress).
125	34	characterization of turbulence, primarily wake flow turbulence.
126	29	elements of power switches and power converters.
127	107	aspects of neural networks, such as learning, recurring, training, and algorithms.
128	38	polymers and polymerization (e.g. Methyl Methacrylate [MMA]), primarily things used to create copolymers.
129	23	extraction and degradation of phenol solutions from wastewater, resins, and pollution.
130	56	types of mining, such as coal, data, and information mining.
131	25	modeling and characterization of shear and plastic deformation, primarily with frozen walls.
132	48	remote sensing imaging (classification, spectral bands, hyperspectral, information, and pixels) of land.
133	22	learning, perceptron, classification, and neural networks.
134	35	channels and receivers (CDMA, Estimation, Rake Receiver, Blind Adaptation).
135	33	terms associated with matrices (e.g. sequencing, non-singular, linear, rank).
136	49	differential equations (ordinary, partial).
137	55	signal to noise ratios (SNR).
138	49	the use of transmission electron microscopy (TEM) primarily used to characterize grain diffraction, powders, and nanostructures.
139	58	uses of fiber optics and lasers, such as fiber optic sensors, fiber lasers, and lasers.

140	38	adaptive control system, primarily predictive, robust, and non-linear systems.
141	41	robotic control.
142	22	characterizing surface roughness, primarily spherical surfaces.
143	28	characteristics associated with size and size distribution, primarily related to small particles (e.g. nanoparticles, powders, pores, liposomes, & membranes).
144	50	companies doing marketing research for knowledge development, such as Alcatel, and Asia-Pacific. Some relation to PCC (Passive Containment Cooling).
145	98	things that affect the reactions of compounds and crystals such as temperature.
146	27	mechanical behavior of thick and thin plate elements.
147	29	things that flow such as fluid, cars, traffic, and pedestrians.
148	47	studies of types of copolymers, such as the grafting processes used to create them.
149	46	physics of reinforcement for fibers, composites, polypropylene, concrete, and glass.
150	39	aspects of boundaries, such as solutions, existence, and boundary conditions.
151	25	characterizing reactions and catalyst involving hydrogen and dimethyl carbonate (DMC), i.e gas reactions.
152	50	vibrational analysis primarily due to wind and engines. Applications could include naval ships & missile launchers.
153	20	using various mathematical methods to join things such as geometric spaces (e.g. lass, poisson, parabolic, and symplectic).
154	43	systems tests (primarily automated) for design, calibration, and precision.
155	36	characterizing polymers.
156	58	types of pulses (laser, reactor, width).
157	31	aspects of iterative equations and solutions, such as convergence, homotopy, and analytical & inverse solutions.
158	54	aspects of wavelets used in signal processing.
159	33	properties of liquied and flow that can be measured and analyzed (e.g. shear, pressure, melt, and viscosity).
160	29	power controller (eg. reactive power) for circuits primarily associated with communications.
161	34	characterizing sulfer and rare earth compounds using spectroscopic techniques.
162	45	digital noise filters, primarily for filtering noise out of digital speech applications (eg. Kalman filter).
163	28	effects of squeezing current.
164	42	feature extraction from images and audio, such as texture, fingerprints, and froth found in coal mixtures.

165	30	characteristics of reactions and synthesis involving alcohols and esters (primary denoted with the term "Beta.'
166	40	elements of information systems such as sharing, specifications, data, standards, and design (CAPP System).
167	38	characterizing fluorescence spectra resulting from electron transfer primarily from naphthalimid (acid) donor compounds.
168	32	types of structural damage such as buckling and axial compression caused by pressures, primarily of cylinder shell structures. Possible applications include artillery shells.
169	34	network paths and optimization algorithms.
170	27	software sub-graph matching techniques, primarily used in wastewater removal applications and analysis.
171	32	modeling and forecasting of loading, primarily on pipes.
172	28	equations primarily associated with perturbations, fluid, wave, beam, nonlinear, and equations of state.
173	31	characteristics of reactions involving ketones, alkyls, aromatics, and olefins.
174	38	virtual instruments for measuring and diagnosis of systems and software.
175	28	elements and properties of radiation (hard X-Rays & electrons) used to characterize things like plasmas and crystals.
176	72	characterization of different films.
177	31	elements of databases (data warehouses & object oriented databases), such as models and data distribution.
178	26	mobile communication systems (automatic, wireless, cdma, and distribution).
179	65	types of beams (e.g. Gaussian, pulse and laser) and their propagation characteristics.
180	51	types of particles (e.g. nano, magnetic, composite, and microspheres).
181	35	properties and characteristics associated with electro and chemical reactions (e.g. hydrolysis) of catalysts like enzymes.
182	30	things that occur with oxidation/oxides such as catalysts.
183	39	characteristics of shock and vortexes (primarily from explosions and over pressures).
184	47	calculations of stress for fracture analysis and prediction (applied to mine shafts, bridges, etc.).
185	39	things primarily annotated with the words "omega", "center dot," and "sub" (textual description to denote that a number as a subscript), primarily associated with characterization studies of crystals such as PbWO & YVO.
186	34	applications of virtual reality systems, such as assembly, tracking, and training.
187	70	applications of finite element modeling primarily applied to structure analysis.
188	44	image segmentation primarily for areas/regions.

189	48	use of irradiation to fabricate nanocrystals.
190	104	image processing.
191	39	characterizing magnetic and electric fields, primarily associated with small electronic devices.
192	30	real-time control applications (traffic, networks, ethernet). Possible military applications include UAV control and tracking multiple small high speed objects.
193	44	elements of electronic devices/equipment, primarily voltage, and others such as current, phase, modulation, and charge.
194	27	methods of detecting and assaying DNA, charges, and endotoxins.
195	34	characterizing chemical and mechanical properties of rubber and polyurethane materials.
196	38	testing of strain and stress fatigue and their rates on things like concrete & welds.
197	38	tings used in nanocomposites such as foams, resin, poly-based materials and hyperbranched structures.
198	61	network security, protocols, and reliability of things such as optic switches.
199	42	software systems, such as their design and tools.
200	38	algorithm, graphs, layout, and placement.
201	71	control systems (e.g. simulated, measurement, and dynamic).
202	50	hardware and software systems design.
203	41	measuring uncertainties with interferometrics, and fiber optics.
204	49	ecology effects on china water resources (rivers [Yellow River], wetlands, and lakes) from climate, pollution, and fertilizers.
205	47	signals, primarily their frequency & time domains.
206	53	heat transfer methods and modeling.
207	38	instruments for measuring/monitoring accuracies.
208	63	elements associated with production, such as marketing, manufacturing, cost, demand, capacity, design, economics, benefits, product lines, concurrance, and models.
209	26	systems (e.g pipelines, data, and vehicles), methods of inspecting and testing them.
210	38	characterizing properties (primarily strength, creep, mechanical, and pozzolanic) of composites such as starch, silk, cement, slurries, and steel.
211	72	measuring systems such as lasers and precision measurements.
212	31	key elements looked at for experimentation of nuclear power plants accidents such as core, fuels, pressure, seals, and explosions.
213	34	characterizing the formation of zinc oxide and liquid crystals.
214	32	various mathematical functions and their elements used in combinatorial math (boolean, scaling, and interpolation functions).
215	75	types of lasers (pump, diode, beam, and optic).
216	35	characterization of composite material properties.

217	37	properties of elements that go thru optics such as photons (wavelength, diffraction, scatter) and aerosols.
218	45	elements of CMOS, circuits and microprocessors architectures.
219	49	solutions (primarily asymptotic) such as existence, approximate, general, nonlinear.
220	34	things such as phase, fringe patterns, and surfaces that can be measured for their interference errors.
221	46	optic and optical properties solids.
222	29	formulas to calculate changes in body shapes due to force and movement.
223	41	properties of silicon and oxide materials used in substrates and wafers.
224	61	non-real-time control applications (e.g. assessing control models & systems).
225	44	analyses of effects of acids, proteins, and lignans on cell walls, to include concentrations and extraction methods.
226	76	methods of flow (rates & phase) analysis.
227	83	sensor measurements.
228	36	net design, for example the Petri-Net Model (P-Net) used for system analysis & design.
229	60	things annotated with the word “sup” (textual description to denote that a number as a superscript), but primarily things that are measured such as ionization & activation energies of atoms (i.e things that are affected by actions).
230	43	data fusion, its elements (information, decisions, data), systems (sensors), models, and applications (monitoring, locating, robotics, speech recognition).
231	38	chaotic theory (e.g. Poincare Map & Birkhoffian models).
232	50	algorithms such as optimized matching algorithms, used in searching fingerprint databases.
233	53	navier stokes equations and solutions used in turbulence flow analysis.
234	47	modeling & simulation.
235	39	uses of lasers and plasmas to help extract or absorb elements.
236	60	image cameras and image matching for change detection analysis applications.
237	80	design, primarily that of systems and architectures.
238	119	algorithms such as vector, computation, and learning.
239	66	algorithms (new & convergence) primarily used for estimation.
240	48	applications and characterization of resonance frequency and wave analysis.
241	61	elements of transportation (urban, country) in China, such as traffic, safety studies, roads, plans, and demand.
242	39	things (e.g. rocket motors, thrust, acceleration, ultrasonics) that produce waves causing damage and/or requiring compensation to structures and materials. Potential application to a New Concept Submarine}

243	37	applications of machine system operations.
244	47	precision measurements and testing (using accelerometers) of things for compensation. Possible applications with rockets and microcircuits.
245	78	precision measurements to reduce measuring errors.
246	67	elements of temperature such as heat, degree, rates, and high/low thresholds.
247	51	equations, primarily associated with matrices, boundaries, and nonlinear.
248	44	elements of monte carlo simulations, such as random samples for probablistic/statistical calculations.
249	51	characterization of delta's (changes) of things such as cracks, pressure, and creep in materials (e.g. piezoelectric materials).
250	59	elements of a system controlled by power (e.g. buses, modules, devices).
251	92	reaction properties of compounds.
252	49	modeling systems such as AMSAA-BISE growth model for multiple systems.
253	90	things requiring measurements (tests, systems, & machines), for example high.
254	61	math modeling & simulation (for applications) for flow of things.
255	54	things calculated such as energy, theory, dynamics, and models.

Appendix 10D – Cluto Taxonomy
-Engineering Compendex
-256 Clusters
-2000-2003 Database

The taxonomy of this EC 2000-2003 data set was derived from the data shown in Appendix 10C (Cluto EC 256-cluster run). Figure A10D-1 (also Figure 5 of the Text) below, shows the top level taxonomy of levels 0-4. In the figure below, the numbers in parentheses represent the number of records (abstracts) associated with that particular cell. The number in brackets represents the percentage of the number of records of the particular cell to the overall number of records 9949 possible).

Figure A10D-1. Partitional Document Clustering (CLUTO) Taxonomy Levels 0-4 (Engineering Compendex, 256 Clusters, year 2000-2003)

LEVEL 0	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
(9949) - Engineering Sciences [100%]	(4721) - Computer Sciences [47%]	(3902) - Cybernetics & Systems Engineering [39%]	(3178) - Power & Systems Engineering [31.9%]	(852) - Power/Energy Market Enterprises [8.6%]
				(2326) - Systems Theory [23.4%]
			(724) - Networks & algorithms (neural, comms, mobile, wireless, genetic) [7.3%]	(387) - networks -- neural, communications, mobile, wireless [3.9%]
				(337) - algorithms - genetic, (adaptable, learning, smart) [3.4%]
		(819) - Signal Processing (image, digital, wavelets) [8%]	(511) - Image Processing (detection & embedding) [recognition, matching, retrieval, segmentation] [5.1%]	(339) - image processing (reconstruction, matching, retrieval, & segmentation) [for similarities] [3.4%]
				(172) - image processing and watermarks (detecting & embedding) [for differences] [1.7%]
			(308) - Signal Processing (wavelets & digital signal processing) [3.1%]	(182) - wavelets in imaging & non-imaging signals [1.8%]
				(126) - digital signal processing to extract signals [1.3%]
	(5228) - Physical Sciences [sub-systems] [53%]	(3477) - Materials Science & Mathematics [35%]	(474) - Mathematics (Solutions & Equations) [4.8%]	(209) - Solutions (Periodic & Non-periodic) [2.1%]
				(265) - Equations [2.7%]
			(3003) - Physics of Structural Mechanics & Materials [30.2%]	(921) - Applied Measurements (with Optics & Lasers) [9.3%]
				(2082) - Structural Mechanics & Materials [20.1%]
		(1751) - Chemistry & Nanotechnology [18%]	(747) - Nano-technology (Nano-structures & Materials) [7.5%]	(285) - Nanostructures [2.9%]
				(462) - Crystals, Glass, Lasers, Plasmas, and Magnetic & Piezoelectric Compounds [4.9%]

			(1004) - Chemistry (Organic & Inorganic) [10.1%]	(285) - Inorganic Chemistry (Solid & Liquid Material Dopping) [2.9%]
				(719) - Organic Chemistry [7.2%]

Figure A10D-2. Partitional Document Clustering (CLUTO) Taxonomy All Levels (Engineering Compendex, 256 Clusters, year 2000-2003)

STRUCTURE OF CHINA RESEARCH - yr 2000-12/19/03 (Based on 9949 of ~87K Abstracts from Engineering Compendex)

LEVEL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	CLUSTER #
					494 (852) - *Power/Energy Market Enterprises*	487 (600) - *Non Fossil Fuel energy market enterprises & environmental impacts*	475 (425) - *Electric power market enterprises*	466 (212) - *Advanced Nuclear Power Reactor Business Enterprises*	414 (109) - *Advanced Nuclear Reactor Design*	313 (59) - Designing Nuclear power plant/reactors for monitoring & minimizing accidents *(the what)*	212 (31) - key elements looked at for experimentation of nuclear power plants accidents - core, fuels, pressure, seals, explosions				**212**
											89 (28) - Nuclear power plants/reactors, -- fuel cycles, accidents, advances,design, burn // supersonic combustion associated w/ fuels & burn				**89**
										144 (50) - Companies doing marketing research for knowledge development - Alcatel, Asia Pacific - some relation to PCC (Passive Containment Cooling) *(who's doing)*					**144**
									423 (103) - *Business Enterprise & Production Elements*	208 (63) - consideration elements of Production - marketing, manufacturing, cost, demand, capacity, design, economics, benefits, product lines, concurrance, models					**208**
										37 (40) - Enterprises & its elements - such as virtual, coal - marketing, partners, competition, cooperation, benefits, knowledge, innovation, economics					**37**
								451 (213) - *Economics of the electric market*	420 (107) - *Economic aspects of Railway Transportation on Electric Market*	289 (58) - *Electric Market*	90 (26) - elements of a market, (taxonomy similar in electric & stock markets, but emphasis on power generation) - contracts, risk, stocks, generation, customs, schedules, transactions, transmission				**90**
											107 (32) - elements of bids/bidding (eg. power generation) - price/cost, unit, market, reserve, constraints, margins, exergy(???)				**107**
										341 (49) - *Train Transportation*	38 (26) - trains, railways, cargo (freight, passenger), optimization, speed				**38**
											40 (23) - elements of transportation (urban, country) in China -- traffic, safety studies, roads, plan, demand				**40**
									382 (106) - *Economic effects of production factors (eg. Safety) on electric market*	241 (61) - Chinese technology advances to reduce power consumption in the production industry of things like of bauxite, paper					**241**
										317 (45) - Safety Science for various accidents associated with large construction projects (such as Hydropower)	99 (23) - Major Project elements associated with Safety - accidents, fire, hydropower construction (eg. Three Gorges Project), economics, capital				**99**
											101 (22) - things that cause landslides - earthquakes, tectonic shifts, slope, drilling,				**101**
							439 (175) - *Assessing water resources & soil interactions on land & vegetation ecology w/ remote sensing imagery*	398 (101) - *Assessing land & vegetation ecology with remote sensing imagery*	132 (48) - remote sensing imaging (classification, spectral bands, hyperspectral, information, pixels) of land						**132**
									268 (53) - *Ecology of land & vegetation*	56 (30) - elements of land cover - vegetation, oasis (Kenya), desertification, arid, ecology					**56**
										116 (23) - sustaining the ecology/environment of forests, soils, due to mining, & economic effects					**116**
								389 (74) - *Water Resources & Soil Interactions/Relationships*	204 (49) - ecology effects on china water resources (rivers(Yellow River), wetlands, lakes) from climate, pollution, fertilizers,						**204**
									43 (25) - settlements of soils (ground, piles, foundations, water, sea, frost/frozen soil)						**43**
						461 (252) - *Identifying/Predicting Problems of Obtaining Fossil Fuels (eg. Coal Mining)*	428 (153) - *Identifying & predicting problems separating Fuels (oil, coal, gas) from their sources*	407 (88) - *Separating Fuels (eg. Oil, coal, gas) Resources from their sources*	261 (45) - *Accumulating Fuel (oil, coal, gas) Resources (basins, reservoirs, source rock)*	100 (22) - oil uses (lubrication, desalting, petrochemical industry - organic), contents, extraction, types (crude, tea), organic, desalt					**100**
										87 (25) - associations with GAS and accumulating it - fields (reservoirs, basins), Jurassic periods, coal, geochemical					**87**
									2 (23) - characteristics associated with fluidization studies - beds, separation, coal, mediums, jig, densities						**2**
								310 (85) - *Coal Mining - Predicting Problems (gasification, & rock outbursts)*	5 (17) - studies for predicting outbursts of rocks (coal) & gases (methane) by monitoring Electromagnetic Emissions/Radiation (EME/EMR)						**5**
									256 (68) - *Coal Mining - Gasification Problem & Improving systems*	105 (46) - study of coal gasification in mines/underground and seams - combustion, seepage					**105**
										70 (22) - studies for advancing china's coal mining capacity (New 5yr Plan) - identifying coal resources, systems (flotation, crushing, machines), economics					**70**
							402 (99) - *Assessing/Modeling Stability of coal mine roofs from information/data*	298 (43) - *Stability of coal mine roofs*	10 (23) - *Support of roofs in mines (coal)/caves*						**10**
									30 (20) - *blasting - strata movement, mines, pillars, -- support*						**30**
								130 (56) - *Mining of coal, data, & information*							**130**
										352 (98) - Information Systems (GIS), its elements and data fusion *(Non Web Based/IT)*	230 (43) - data fusion - elements (information, decisions, data), systems (sensors), models, applications (monitoring, locating, robotics, speech recognition)				**230**
											272 (55) - Information	166 (40) - information systems elements - sharing, specifications, data, standards, design (GATS System)			**166**

LEVEL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	CLUSTER #
			504 (3902) - *Cybernetics & Systems Engineering*	503 (3178) - *Power & Systems Engineering*		493 (1450) - *General Systems Theory (Macro & Micro Systems)*	484 (997) - *Macro Systems Theory*		448 (208) - *Systems (Robotic, Multi-agent, Virtual)*	417 (156) - *Robotic Systems*	392 (114) - *Systems (Real & Virtual)*		186 (34) - Applications of virtual reality systems - (assembly, tracking, training)		186
												288 (57) - *Systems (Real) - Machine systems (production/scheduling & operations)*	65 (20) - scheduling - coal plants, production, machines (Operating characteristics & things to enable the use of these systems)		65
													243 (37) - Applications of machine system operations		243
											141 (41) - robotic control				141
								481 (600) - *Systems Theory (Software Design, Modeling & Simulation)* [MACRO]	443 (241) - *Designing, Integrating of Software & Hardware Systems*	237 (80) - *Designing of systems, architectures*					237
										416 (161) - *Software & Hardware Systems, applications, and testing*	290 (92) - Software *systems & integration into hardware systems*	199 (42) - software systems - design, tools			199
												202 (50) - hardware & software systems - design *(applications)*			202
											269 (69) - *Systems tests - types & applications*	154 (43) - systems tests, automated - for design, calibration, precision *(types of system tests ??)*			154
												209 (28) - systems inspections & tests - pipelines, vehicles, & methods *(applications of systems tests??)*			209
									453 (359) - *Modeling & Simulation - (Systems Analysis & Statistical Modeling Tools)*	378 (193) - *Modeling & Simulation - (System Analysis Net Design & Multiple Systems Growth Models)*	339 (83) - *Modeling & Simulation - for System Analysis & Net design (Petri-Net Model)*	228 (36) - net design, --- Petri-Net Model (P-Net) used for system analysis & design *(model types & characteristics)*			228
												234 (47) - modeling & simulation *(applications)*			234
											325 (110) - *Modeling & Simulation - for growth models for multiple systems (AMSAA BISE)*	252 (49) - modeling systems - ***AMSAA-BISE growth model for multiple systems*** *(model types & characteristics)*			252
												254 (61) - math modeling & simulation *(for applications)* - numerical, fractals -- for flow of things			254
										418 (166) - *Modeling & Simulation Tools (Statistical & Chaotic Theory)*	354 (98) - *Modeling & Simulation (Monte Carlo Calculations)*	248 (44) - monte-carlo simulations (random samples for probabilistic/statistical calculations) *(elements of)*			248
												255 (54) - things calculated (energy, theory, dynamics, models) *(applications)*			255
											327 (68) - *Modeling & Simulation (Chaos Theory & Bifurcation problems)*	231 (38) - chaotic theory - (e.g. Poincare Map, Birkhoffian models) -			231
												96 (30) - chaos theory - *bifurcation* problems, stocastic, non-linear *(applications)*			96
					501 (2326) - *Systems Theory*		476 (453) - *Micro Systems Control Theory (Electronic & Data)*	450 (259) - *Electronic Control Systems* [Screening things]	415 (146) - *Drive & Control Systems*	292 (55) - elements of drive systems & control (motors, power, switches, converters)	59 (28) - drive (systems, motors [reluctance & induction], controls) [TYPES]				59
											126 (29) - *Elements of Power Switches & Power Converters)* [ELEMENTS]				126
										348 (91) - precision measurements & testing of electronic devices for compensation adjustments	193 (44) - *Elements of electronic devices/equipment (primarily VOLTAGE, and others such as* **current, phase, modulation, charge)** [ELEMENTS]				193
											244 (47) - precision measurements & testing (using *accelerometers*) of things for compensation (applications - rockets, microcircuits) [TYPES]				244
									409 (113) - *Digital Noise Filtering, Microprocessor Circuitry*	262 (68) - *Microprocessor Circuitry and its effects*	218 (45) *Elements of CMOS, circuits & microprocessors architectures* [ELEMENTS]				218
											110 (23) Circuits *(e.g. arc-discharging, models)* [TYPES]				110
										102 (45) - *Digital Noise Filters* - ***primarily for filtering noise out of digital speech***					[illegible]

Cluto (EC - 256)

LEVEL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	CLUSTER #
						497 (876) - *Control Systems (Precise & Non-precise) Theory*		388 (238) - *Control Systems (Applications, Algorithms, Simulated & Intelligent)*	355 (142) - *Control Systems (Applications & Algorithms)*	295 (91) - *Control Systems Applications*	224 (61) - *Non-Real-time Control applications* (e.g. assessing control models & systems)				224
											192 (30) - *Real-time Control applications* (traffic, networks, ethernet) (NOTE: Military Applications - UAV control, tracking multiple small high speed objects)				192
										114 (51) - *Control Systems Algorithms (Fuzzy Control, Proportional Integral Derivative (PID) Control)*					114
							491 (562) - *Non-precise Control Systems Theory*	485 (408) - *Control Systems of Non-physical Elements -- (Applying Linear Algebra & Boundary Conditions to Knowledge-Based Systems & Fuzzy Neural Networks for Fault Diagnosis)* **[Putting things together] [Control of establishing boundary limits]**	452 (141) - *Applications of Fuzzy Neural Network Theory to Knowledge Based Systems & Fault Diagnosis*	112 (66) - *FUZZY neural network theory*					112
										395 (75) - *Expert Knowledge Based Systems & Fault Diagnosis*	63 (36) - *Neural network methods used in expert systems FAULT diagnosis* (NOTE: different worded duplicates? - 6401 & 6402 txt records) **[~applying the Rules to ID broken Rules]**				63
											102 (37) - *Mechanisms of KNOWLEDGE based systems (Cased-Based Reasoning, Rule-Based Reasoning)* (NOTE: 6668txt - acquiring military knowledge from texts in the Electronic Encyclopedia of China) **[~the Rules]**				102
									458 (267) - *Boundary Conditions & Linear Algebra Theory*	329 (69) - *Conditions (Stability & Sufficient)*	93 (39) - Things associated with *Stabilization Analysis* (e.g. system stability, asymptotic stability, time delays)				93
											104 (30) - Things that rely on *Sufficient Conditions*, such as systems stability & control systems				104
										435 (196) - *Applied Linear Algebra/Matrix Theory*	374 (74) - *Principles of Matrix Operations*	135 (33) - *Terms associated with matrices* (e.g. sequencing, non-singular, linear, rank)			135
												296 (41) - *Mathematical methods for establishing Bounds*	42 (21) - Methods for establishing *Bounds of linear things* (Drazin inverse, upper, lower)		42
													68 (20) - Methods for establishing *Bounds of non-linear things, e.g.* ***Bezier curve***, weakest bound electron potentials		68
											404 (124) - *Mapping/Transformation Theory*	338 (90) - *Mapping of inequality Spaces*	285 (38) - *Algebra - Symplectic Mapping*	153 (20) - *Using various mathematical methods to join things such as geometric spaces --* (lass, poisson, parabolic, symplectic - *(Note: 99497263 & 64 are the same)*	153
														33 (18) - *Elements of algebra that used in mapping/joining* such as subspace lattices, Lowen functors, Lie-algebra	33
													32 (22) - *Mapping of inequality spaces (multivalue* & multivariant, Banach Spaces)		32
												332 (64) - *Mapping Theorems & Functions*	119 (32) - *Theorems used in mapping spaces* (existance, fixpoint)		119
													214 (32) - Various *mathematical functions and their elements used in combinatorial math* (Boolean, scaling-, interpolation-functions)		214
								477 (154) - *Control Systems of Physical Elements -- (Deconvolution)* **[Taking things apart]**	362 (81) - *Deconvolving of Quantum (discrete) & Entangled (mixed) States --* **[Deconvolving Atomic particles]**	94 (31) - quantum States *(discrete states - decomposing these, superposition - systems of things to be decomposed)* - of hyperspheres, systems, orbits, qkd--quantum key distribution					94
										34 (50) - entangled States *(mixed states - elements of the system to be decomposed)* - of quantum, atoms, photons					34
									360 (73) - *Deconvolving - Elements of papermaking (bleaching & deinking pulp)* - **[Deconvolving compound materials]**	25 (23) - deinking of pulp, newsprint -- *(breaking things out/deconvolving discrete states)* applied to papermaking process -- [ref: 994926 & 27 records duplicate, but just words changed around]					25
										54 (58) - *pulp, bleach (specific elements used in decomposing) - as applied to the papermaking process*					54

LEVEL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	CLUSTER #
	510 (2949) - Engineering Sciences			comms, mobile, wireless, genetic)		387 (178) - neural networks —	networks - radial basis function, training algorithms	networks	19 (23) - radial basis function (rbf), neural networks						19
								127 (107) - neural networks - learn, recurring, train, - algorithms							127
							13 (26) - artificial neural networks (ANN)								13
					455 (337) - algorithms - genetic, (adaptable, learning, smart)	97 (64) - genetic algorithms									97
						401 (273) - algorithms - convergence, learning, matching, optimization	312 (185) - algorithms (convergence, estimation, learning)	239 (66) - algorithms (new, convergence) - estimation							239
								238 (119) - algorithms - vector, computation, learn							238
							335 (88) - algorithms (matching, optimization, graphs, layouts) - eg application is fingerprinting	200 (38) - algorithm - gr apha, layout, placement							200
								232 (50) - algorithms – fingerprints, optimized matching algorithms							232
			498 (819) - Signal Processing (image, digital, wavelets)	471 (511) - image processing (detection & embedding) [recognition, matching, retrieval, segmentation]	432 (339) - image processing (reconstruction, matching, retrieval, & segmentation) [for similarities]	406 (211) - image processing (reconstruction & matching)	304 (47) - image reconstruction of tomography, ultrasound, photoacoustic modalities (applied to tissues)	55 (22) - tissue, tomographic imaging, ultrasound, photoacoustic —							55
								36 (25) - image reconstruction							36
							336 (164) - image processing for scene matching	236 (60) - image cameras & matching –							236
								190 (104) - image processing –							190
						386 (128) - image retrieval & segmentation	283 (70) - image segmentation	188 (44) - image segmentation – for areas/regions							188
								44 (26) - segmentation imaging — for lines, such as palmprints & handwriting id							44
							320 (58) - image retrieval of objects in video & color images	120 (25) - detecting objects, contours, & motion in video and color images							120
								27 (33) - image retrieval (content based/object based) –							27
					462 (172) - image processing and watermarks (detecting & embedding) (for differences)	447 (145) - image processing (edge detection, pattern recognition, & feature extraction) - of biometrics & SAR images	333 (71) - image pattern recognition & feature extraction	50 (29) - image pattern recognition - facial recognition (biometrics) –							50
								164 (42) - feature extraction from (images, audio) – features (texture, fingerprints, froth (in coal mixtures), etc)							164
							375 (74) - image processing edge detection techniques in SAR imaging	282 (44) - image processing - edge detection techniques	24 (19) - wavelet transforms applied tp edge detection --- [NOTE: CLUSTER HAD 3 DUPLICATE ABSTRACTS W/ DIFFERENT #]						24
									28 (25) - edge detection imaging –						28
								22 (30) - SAR imaging —							22
						0 (27) - imaging watermarks (embedding & detecting)									0
				473 (306) - Signal Processing (wavelets & digital signal processing)	363 (182) - wavelets in imaging & non-imaging signals	279 (107) - wavelet transform (images & non-image signals) for image compression & signal detection (freq & time)	61 (32) - wavelet transform - image compression, coder, coefficient matching								61
							123 (75) - wavelet transform - signal detection - frequency & time (primarily non-imagery)								123
						301 (75) - wavelet & multiwavelet packet transforms - ????	158 (54) - wavelets - multiwavelets								158
							20 (21) - wavelet packet transform -								20
						137 (55) - SNR (signal to noise ratio)									137

LEVEL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	CLUSTER #
						(differential)	*(differential)*	136 (49) - equations (*differential* [ordinary, partial]) -							136
					456 (265) - *Equations*	384 (148) - Equations *(soliton solutions, iterative, & nonlinear)*	57 (38) - *equations (soliton solutions) - waves, exact, nonlinear*								57
							331 (110) - *Equations (iterative, integral, & nonlinear)*	157 (31) - equations (*iterative, integral*) solutions - convergent, analytical, inverse, homotopy							157
								285 (78) - Equations *(nonlinear)*	247 (51) - equations - matrices, boundaries, solving, nonlinear						247
									172 (28) - equations - perturbations, fluid, wave, equation of state, beam, nonlinear						172
					498 (921) - *Applied Measurements (with Optics & Lasers)*	474 (391) - *Optics & Lasers*	463 (281) - *Physics of Optics & Lasers*	426 (148) - *Physics of Optics*	322 (83) - *Properties of optics & elements in optics*	217 (37) - *Properties of elements thru optics such as photons* (wavelength, diffraction, scatter) - ***in aerosols***					217
										221 (46) - *Properties of optics/optical* (light, field, lens) - in **solids**					221
									179 (65) - *Types of beams and their propagation characteristics* (propagation, gaussian, pulse, laser)						179
								413 (133) - *lasers (pulsed & pumped)*	156 (58) - *Types of pulses* (laser, reactor, width)						156
									215 (75) - Types of lasers (pump, diode, beam, optic) - use in cavities ??						215
							358 (110) - *Fiber Optics & Lasers*	270 (52) - *Fiber Optic & Laser Characteristics*	64 (18) - *Properties of lasers & fiber optic materials* - birefringence (*light refraction in an anisotropic material*) - Polycyclic aromatic hydrocarbons (PAHs)						64
									66 (34) - *Methods to improve the gain of fiber optics* (i.e. pumping, raman amplifiers, doping, reducing dispersion)						66
								139 (58) - *Uses of Fiber Optics & Lasers - (fiber optic sensors, fiber lasers, and lasers)*							139
						467 (530) - *Measurement Science*	449 (447) - *Mechanics/Principles of Measurements*	441 (279) - *Measurements (Principles & Assessments/Diagnostic s)*	281 (76) - *Instruments for measuring accuracies/diagnosis* (real & virtual)	174 (38) - *virtual instruments for measuring* (systems, software) - *diagnosis*					174
										207 (38) - *Instruments for measuring/monitoring accuracies --- (REF: 9949H293txt - optical properties of seawater => possible military applications - e.g. sensing/comms)*					207
									357 (203) - *measurements of (precision & uncertain)*	203 (41) - *measuring uncertainties* - with (interferometrics, optics, fiber ---					203
										337 (162) - *measurements - precise*	253 (90) - measuring - what you measure (things requiring measurements (tests, systems, machines) -- e.g. *application high explosives (Ref: 994910txt - NUCLEAR BOMBS, or possible neutron detector)*				253
											211 (72) - measuring systems - lasers, precision measurements				211
								405 (168) - *Error Measurements*	379 (138) - *Error Measurements of (precision & interference [uncertainty])*	318 (60) - *Error Measurements due to interference* (diffraction) - of things causing errors (uncertainties)	52 (26) - *Types of Error Measurements (caused by interference)* - angle, error, diffraction, Moire -- (Note: grate => grating, integrate, migrate)				52
											220 (34) - *What things with interference errors are measured* - phase, fringe patterns, surfaces ---				220
										245 (78) - *Precision measurements to reduce measuring errors*					245
									58 (30) - *Error Measurement Calibration*						58
							227 (83) - *Sensor Measurements*								227
							489 (622) - *Flow in Structures* (Microstructures - *waveguides, Macrostructures - tunnels)*	480 (365) - *Flow in Microstructures (e.g. flow of electromagnetics in small waveguides)*	430 (188) - *Small Antenna Design Theory*	361 (100) - *Micro Antenna Theory*	334 (52) - *Physics of Micro Antennas (Antenna Patches & Microstrips)*	163 (28) - *Effects of SQUEEZING CURRENT*			163
												67 (24) - *Types of micro ANTENNAS (Patch & Microstrip) & micromachining techniques*			67
											240 (48) - *Applications and characterization of RESONANCE FREQUENCY and wave analysis* **[APPLICATION/CHARACTERIZATION]**				240
										377 (88) - *Dielectric & Millimeter Waveguide Antenna Theory*	300 (54) - *Physics of dielectric & millimeter waveguides*	74 (24) - *Types of millimeter wave guides (e.g. Helical-grooved)*			74
												118 (30) - *Elements and properties of dielectric waveguides*			118
											51 (34) - *Multimode Network Theory applied to dielectric & millimeter antenna wave guides*				51
									465 (177) - *Damage Analysis of Structures*	411 (80) - *Structure Analysis due to Bending Moments and Vibrations*	152 (50) - *VIBRATIONAL analysis primarily due to wind and engines* (NOTE: Applications - Naval ships & missile launchers)				152
											31 (30) - *Bending moments to SHIP hulls and girders*				31
										314 (97) - *Structure Analysis of Elements & Finite Element*	146 (27) - *Mechanical behavior of thick & thin plate ELEMENTS* **(and term "Elements")**				146
											187 (70) - *Applications of Finite Element Modeling primarily*				187

Cluto (EC - 256)

LEVEL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	CLUSTER #
		509 (5228) - Physical Sciences **[sub-systems]**		506 (3003) - Physics of Structural Mechanics & Materials	502 (2082) - Structural Mechanics & Materials	495 (1258) - Fluid Dynamics	486 (636) - Flow Mechanics & Thermodynamics	459 (335) - Flow Mechanics of Shock Waves & Turbulence	429 (197) - Mechanics of Shock Waves & Turbulence	384 (110) - Effects of Shock Waves & Vortexes	340 (71) - Applications of Shock Wave & Vortexes **(rocket motors & cylindrical shell structures)**	168 (32) - Types of structural damage caused by pressures such as CYLINDER SHELL STRUCTURES (BUCKLING & axial compression) **[Applications - artillery shells]**			168
												242 (39) - Things that produce waves causing damage/requiring compensation to structures & materials (e.g. ROCKET MOTORS, thrust, acceleration, ultrasonics) (Ref - 420.txt - New Concept Submarine; solid rocket motors)			242
											183 (39) - Characteristics of SHOCK waves & vortexes (primarily from explosions, over pressures)				183
										349 (87) - Wake Flow Turbulence Analysis	233 (53) - NAVIER STOKES EQUATIONS & SOLUTIONS used in turbulence flow analysis				233
											125 (34) - Characterization of TURBULENCE (WAKE FLOW turbulence)				125
									368 (138) - Flow Mechanics	226 (76) - Methods of FLOW (rates, phase) analysis					226
										330 (62) - Applications of Flow Mechanics	147 (29) - Things that FLOW such as FLUID, cars, traffic, pedestrians				147
											159 (33) - Properties of LIQUID & FLOW that can be measured and analyzed (shear, pressure, melt, viscosity)				159
								464 (301) - Applied Thermodynamics (Flow of Heat)	442 (220) - Heat Transfer	345 (78) - Mechanisms of Heat Transfer	86 (25) - Structural heat transfer mechanisms such as TUBES & FINS				86
											206 (53) - HEAT TRANSFER methods and modeling				206
										391 (142) - Properties of Heat Transfer	246 (67) - Elements of TEMPERATURE such as heat, degree, rates, and high/low				246
											328 (75) - Thermal Properties of Composite Materials	273 (40) - Characterization of thermal conductivity of composite materials (PCM's & electrolyte composites)	47 (19) - Characterizes the thermal conductivity of shape stabilized Phase Change Materials (PCM's) such as paraffin		47
													98 (21) - Characterizes the thermal conductivity of electrolyte composite materials during explosions		98
												216 (36) - Characterization of COMPOSITE MATERIAL properties			216
									370 (81) - Minimizing Fire & Thermal Degradation	15 (22) - Characterizing FLAME RETARDANTS and thermal degradation					15
										299 (59) - Physics of Fire & Combustion	75 (31) - Characterizing COMBUSTIONS and heat release & burn rates				75
											72 (28) - Characterizes the ignition & spread of FIRE				72
						490 (824) - Surface Materials & Mechanics	493 (685) - Material Mechanics (Composites, Compounds, & Coatings)	470 (357) - Mechanics of Composite & Compound Materials	457 (249) - **Fracture Mechanics/** Strength & Fatigue of Material Composites/Compounds	421 (131) - Fatigue Damage (Surface Wear, Cracks & Corrosion)	371 (83) - Surface Wear due to Friction	280 (51) - Surface Roughness & Shapes	222 (29) - FORMULAS to calculate changes in body shapes due to force and movement		222
													142 (22) - Characterizing surface roughness (primarily spherical surfaces)		142
												77 (32) - WEAR of surfaces of composites & steel, primarily from friction			77
											264 (48) - Fatigue Damage (Cracks & Corrosion)	117 (22) - Fatigue damage (CORROSION & Cracks) primarily to stainless steel from tritium **(Applications - Nuclear Power)**			117
												45 (26) - Fatigue damage (CRACKS)			45
										376 (118) - Strength Properties of Composites/Compound Materials	149 (46) - Physics of reinforcement for FIBERS, composites, polypropylene, concrete, and glass				149
											319 (72) - Material Properties (Strength, Mechanical & Chemical) of Compounds	210 (38) - Characterizes properties (primarily STRENGTH, creep, mechanical, and pozzolanic) of composites (starch, silk, cement, slurries, steel)			210
												195 (34) - Characterizes chemical & mechanical properties of rubber & polyurethane materials			195
									427 (108) - Things to compensate for fractures/damage in Alloys (Composite & Compound Materials)	115 (49) - Characterizes the microstructure properties of ALLOYS **(such as shape memory effect [SME], bonding,and strength)**					115
										366 (59) - Applying Coatings & Depositions	49 (25) - Methods of applying COATINGS to larger things such as grains, bones, and alloys (e.g. arc-spraying & implantation)				49
											82 (34) - Methods of deposition on smaller things such as diamond films, filaments, and substrates (e.g. chemical vapor deposition)				82
											60 (38) - Property studies of SIO & TIO (rutile) substance				60

Cluto (EC - 256)

LEVEL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	CLUSTER #
										Substrates & Wafers	223 (41) - Properties of SILICON & OXIDE materials as substrates and wafers				223
							316 (159) - Materials (Films & Substrates)	259 (87) - Thin Films & Substrates	71 (42) - Characterization of THIN FILMS						71
									92 (45) - Methods of growing FILMS and depositing them on substrates						92
								176 (72) - Characterization of different FILMS							176
			505 (1751) - Chemistry & Nanotechnology	492 (747) - Nano-technology (Nano-structures & Materials)	446 (285) - Nanostructures	419 (164) - Nanostructures (Nanowires, Nanotubes, Nanocrystals)	346 (38) - Longitudinal Nanostructures (Nanowires, Carbon Nanotubes)	12 (23) - CARBON NANOTUBES							12
								4 (16) - NANOWIRES							4
							381 (125) - Nanocrystals	189 (48) - Use of IRRADIATION to fabricate nanocrystals							189
								315 (77) - Principles & Methods of Radiation to Characterize nanocrystals	175 (28) - Elements & properties of RADIATION (hard X-Rays & electrons) used to characterize things like plasmas & crystals						175
									138 (49) - The use of TRANSMISSION ELECTRON MICROSCOPE (TEM) primarily used to characterize grain diffraction, powders, & nanostructures						138
						303 (121) - Nanorods	85 (40) - Crystal Formation & Morphology (Note: the terms SUB & CENTER DOT are textual descriptions of characters used in formulas)								85
							91 (61) - NANORODS (Note: the term SUB used as subscripts in math and chemical notations)								91
					444 (462) - Crystals, Glass, Lasers, Plasmas, and Magnetic & Piezoelectric Compounds	7 (132) - Properties of compounds such as crystals and glass									7
						380 (330) - Reactions & Catalysts of Crystals, Compounds (Magnetic & Piezoelectric), Lasers & Plasmas	307 (220) - Reactions & Catalysts of Crystal & Compounds	284 (126) - Oxide/Oxidation Catalysts of Compounds & Crystals	145 (98) - Things that affect the reactions of compounds & crystal (e.g temperature)						145
									182 (30) - Things that occur with oxidation/oxides such as CATALYSTS						182
								251 (92) - Reaction properties of compounds							251
							344 (110) - Magnetic & Piezoelectric Materials, Lasers & Plasmas	323 (71) - Mechanical & Non-Mechanical Change Behavior in Materials (Piezoelectric & Magnetic)	16 (20) - Things such as MAGNETIC FIELDs that cause changes in materials (e.g. MnO) stiffen [Non-Mechanical - things that affect]						16
									249 (61) - Characterization of DELTA's (changes) of things such as cracks, pressure, and creep in materials (e.g. piezoelectric materials) [Mechanical - things that occur]						249
								235 (39) - Uses of lasers and plasmas to help extract or absorb elements [properties]							235
				500 (1004) - Chemistry (Organic & Inorganic)	434 (285) - Inorganic Chemistry (Solid & Liquid Material Dopping)	372 (136) - Solid Material Compound Dopping (Crystals)	276 (61) - Materials (Crystals & Neutrons)	121 (22) - Studies of NEUTRON Flux Densities behaviors in different mediums [Applications: Nuclear Power & Neutron Activation uses]							121
								185 (38) - Things primarily annotated with the words OMEGA, CENTER DOT & SUB (textual description to denote that a number as a subscript), primarily associated with characterization studies of crystals such as PbWO & YVO							185
							95 (77) - Things primarily annotated with the words SUP & SUB (textual descriptions to denote that numbers as subscripts & superscripts), primarily associated with the characterization of STATES/transition states of elements (e.g. ions/ionization)								95
						373 (147) - Liquid Material Compound Dopping	287 (106) - Materials (Ion Dopping & Laser Interactions)	229 (80) - Things primarily annotated with the word SUP (textual description to denote that a number as a superscript), primarily things that are measured such as ionization & activation energies of atoms [things that are affected by actions]							229
								73 (48) - Things primarily annotated with the words BETA & SUP (textual description to denote that a number as a superscript), primarily associated with characterization studies of ion-doped materials using laser pumps [things that cause action]							73
							62 (41) - Things primarily annotated with the words TIMES (meaning multiplication) & SUP (textual description to denote that a number as a superscript), primarily associated with MOLs in chemical concentration formulas								62
						469 (217) - Materials (Nanocomposites, Polymers & Copolymers) [COMPOSITE MATERIALS]	424 (103) - Materials (Nanocomposites)	21 (34) - Studies of types of NANOCOMPOSITES (Clay, Montmorillonite [MMT], Graphite Oxides)							21
								347 (69) - Physics of Nanocomposite Materials	46 (31) - Mechanics, kinetics, and properties of preparing BLENDs like epoxys & resins of poly-based materials (e.g. curing, crosslinking)						46
									197 (38) - Things used in nanocomposites such as FOAMS, resin, poly-based materials and hyperbranched structures						197
							399 (114) - Materials (Polymers & Copolymers)	148 (47) - Studies of types of COPOLYMERS the grafting processes used to create them							148
								309 (67) - Physics of Polymers & Polymerization	18 (29) - Primary properties used to characterize copolymers such as MOLECULAR WEIGHT DISTRIBUTION						18
									128 (38) - POLYMERS & POLYMERIZATION (e.g. Methyl Methacrylate (MMA)) [Things used to create copolymers]						128
							412 (189) - Organic Materials Reactions & Catalysts	113 (43) - Principles of CATALYSTS and catalytic processes/materials							113
								393 (146) - Reactions of Organic Materials	324 (85) - Reactions - Electro-Chemical of Gas & Liquids	287 (50) - Characterizing Reactions of Liquids & Gas	151 (25) - Characterizes reactions and catalyst involving HYDROGEN & Dimethyl Carbonate (DMC) [Gas Reactions]				151
											106 (25) - Properties of REACTORS primarily associated chloration & dechlorination processes used to remove pollutants from water/liquids [Liquid Reactions]				106
										181 (35) - Properties & Characteristics associated with Electro & Chemical REACTIONS (e.g. hydrolysis) of catalysts like enzymes					181
									274 (61) - Reactions of Organic Materials (Alkanes, Alkenes,	173 (31) - Characteristics of REACTIONS involving KETONES, ALKYLS, aromatics, and olefins					173

Cluto (EC - 256)

LEVEL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	CLUSTER #
									359 (74) - *Reactions of Polymer Chains*	278 (38) - *Chains (polymer & molecular, and supply chain manufacturing)*	79 (22) - *polymer and molecular chains*				79
											8 (16) - *supply chain manufacturing (scm) and enterprising*				8

Appendix 11 Manual Categorization - Word Counts (SCI)

#	# of AUTHOR KEYWORDS	# of KEY WORDS	# ABST WDS	Abstract	Title	Year	AuthorKeywords	Keywords	Journal	THEME CATEGORIZATION	SUB-THEME	RESEARCH TYPE	CLARITY (1-5BEST)
1	12	4	173	Sweet cher	Effects of	2002	sweet cherry; physiological	VEGETABLES; QUALITY;	ACTA BOTANICA SINICA	BIOLOGICAL & MEDICAL SCIENCES	STRESS PHYSIOLOGY	6.3	5
2	19	16	212	To extract	Investiga tion on	2002	pigment indices; pigment	REFLECTANCE RED EDGE;	ACTA BOTANICA SINICA	BIOLOGICAL & MEDICAL SCIENCES	STRESS PHYSIOLOGY	6.3	5
3	5	7	84	The highly	Assignm ent and	2002	CO2; vibrational spectra; statistical	CARBON-DIOXIDE;	ACTA CHIMICA SINICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
4	11	3	178	The reactio	One-dimensio	2002	one-dimensional chain; crown	COORDINATION; CATION;	ACTA CHIMICA SINICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
5	5	11	37	Carbonylat	The first example	2002	ionic liquids; carbonylation;	HYDROGEN-DEUTERIUM	ACTA CHIMICA SINICA	CHEMISTRY	ORGANIC CHEMISTRY	6.1	4
6	8	0	273	The couplir	Coupling reaction	2002	butadiene; styrene; anionic		ACTA POLYMERICA SINICA	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
7	6	1	268	The nanoc	Studies on the	2002	phenol resin; intercalation;	RESIN	ACTA POLYMERICA SINICA	MATERIALS	PLASTICS	6.1	5
8	11	2	238	The native	Study of native	2002	compact polmyer; HP model;	PROTEINS; MODEL	ACTA POLYMERICA SINICA	CHEMISTRY	POLYMER CHEMISTRY	6.1	4
9	0	5	64	High-tempe	Preparati on of	2002		CERAMIC FIBERS;	ADVANCED COMPOSITES	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	4
10	0	1	101	Quail and p	Cloning and	2002		PROTEIN	ANIMAL BIOTECHNOLOGY	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.2	5
11	7	0	95	In this pape	A ratio-depende	2002	predator-prey model; global		APPLIED MATHEMATICS AND	MATHEMATICAL & COMPUTER SCIENCES	OPERATIONS RESEARCH	6.2	5
12	13	0	72	By means o	Researc h of	2002	petroleum; drilling fluid; shaker; Delta-		APPLIED MATHEMATICS AND	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.2	4
13	5	1	103	In this pape	Existenc e of	2002	neutral difference equations;	OSCILLATIONS	APPLIED MATHEMATICS	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.2	4
14	19	5	216	NGC 3628	NGC 3628:	2002	galaxies : active; galaxies :	SEYFERT-GALAXIES; LEO	ASTRONOMY & ASTROPHYSICS	ASTRONOMY & ASTROPHYSICS	ASTRONOMY	6.1	5
15	8	9	177	Cephalexin	Enzymati c	2002	aqueous two-phase systems;	PENICILLIN-G ACYLASE; 2-	BIOCHEMICAL ENGINEERING	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.1	4
16	15	11	83	The system	Possible strategy	2002	animal cell culture; bioreactions; fed-	OXYGEN-CONSUMPTION	BIOCHEMICAL ENGINEERING	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.2	5
17	0	0	116	Two kinds	Synthesi s and	2002			BIOORGANIC & MEDICINAL	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.1	4
18	8	1	111	An efficient	An efficient	2002	numerical simulation;	FLOWS	BUILDING AND ENVIRONMENT	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	STRUCTURAL ENGINEERING & BUILDING	6.2	4
19	5	0	81	Polysaccha	A neutral beta-D-	2002	polysaccharides; Phoenix dactylifera		CARBOHYDRATE RESEARCH	CHEMISTRY	PHYSICAL CHEMISTRY	6.2	4
20	0	2	47	A novel so	Mechani sm of	2002		SONOCHEMICAL SYNTHESIS	CHEMICAL COMMUNICATIONS	CHEMISTRY	INORGANIC CHEMISTRY	6.2	5

21	0	9	95	Single-crys	Synthesi s of NiO	2002		SEMICONDUCTO R NANOWIRES;	CHEMICAL PHYSICS LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
22	0	4	28	An ANA-typ	Preparati on and	2002		PERMEATION; ANALCIME;	CHEMISTRY LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
23	5	5	49	Consider a	Instability of	2002	traveling wave; Kuramoto-	STEADY SOLUTIONS;	CHINESE ANNALS OF MATHEMATICS	MATHEMATICAL & COMPUTER SCIENCES	THEORETICAL MATHEMATICS	6.1	3
24	5	5	85	Two new k	Synthese s and	2002	carbonyl transition-metal complexes;	ALPHA-CYCLODEXTRIN;	CHINESE JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
25	6	5	59	The crystal	Preparati on of	2002	solvothermal synthesis; sulfide;	SEMICONDUCTO R	CHINESE JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
26	6	2	36	Microwave	Microwa ve	2002	microwave irradiation; N-alkyl-	HIGH-SPEED; PHASE	CHINESE JOURNAL OF ORGANIC	CHEMISTRY	ORGANIC CHEMISTRY	6.1	5
27	0	7	49	We have e	Realizati on of the	2002		LOGIC GATES; COMPUTATION;	CHINESE PHYSICS LETTERS	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.2	4
28	0	3	64	Directed flo	Centralit y	2002		COLLECTIVE FLOW;	CHINESE PHYSICS LETTERS	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
29	0	11	107	The optical	Optical transient	2002		FEMTOSECOND SPECTROSCOPY	CHINESE PHYSICS LETTERS	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
30	0	6	97	Droplets of	Kinetics of the	2002		BULK METALLIC-GLASS; HIGH-	CHINESE PHYSICS LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
31	0	7	51	The electro	Mean-field	2002		HIGH-TC SUPERCONDUC	CHINESE PHYSICS LETTERS	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
32	13	1	72	sigma-LET	sigma-LET	2002	static random access memory;	SINGLE	CHINESE SCIENCE BULLETIN	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
33	6	5	156	A 50-m firn	Decreasi ng trend	2002	Antarctica; firn core; decline of	DRONNING-MAUD-LAND; ICE-	CHINESE SCIENCE BULLETIN	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.3	5
34	10	0	139	The volum	Thermal expansio	2002	lead zirconate titanate; thermal		CHINESE SCIENCE BULLETIN	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
35	15	3	150	With wax c	High molecula	2002	biodegradation; heavy oil; high-	TEMPERATURE GAS-	CHINESE SCIENCE BULLETIN	ENVIRONMENTAL POLLUTION & CONTROL	WATER POLLUTION & CONTROL	6.3	4
36	17	0	277	This study	Vibration analysis	2002	FEA model; ANSYS; printed		COMPUTERS & STRUCTURES	BIOLOGICAL & MEDICAL SCIENCES	MEDICAL FACILITIES, EQUIPMENT & SUPPLIES	6.2	5
37	0	11	139	Electroche	Anomalo us	2002		GRAPHITIZED MESOCARBON	ELECTROCHEMICAL AND SOLID STATE	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
38	0	4	68	We presen	Persiste nce of	2002		EXISTENCE; INTEGRABILITY;	ERGODIC THEORY AND DYNAMICAL	PHYSICS	FLUID MECHANICS	6.2	4
39	6	0	99	The aerate	Sludge accumul	2002	aerated lagoon; sludge		FRESENIUS ENVIRONMENTAL	ENVIRONMENTAL POLLUTION & CONTROL	WATER POLLUTION & CONTROL	6.3	5
40	6	0	35	A method i	Optimize d BES	2002	optimized data taking time; BES;		HIGH ENERGY PHYSICS AND	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.2	3

41	9	4	152	The new nu	Description of the	2002	RMF theory; superheavy	SUPERHEAVY ELEMENTS;	HIGH ENERGY PHYSICS AND	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
42	17	9	171	Acquired re	Atypical epithelial	2002	acquired renal cystic disease;	CELL CARCINOMA;	HUMAN PATHOLOGY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.3	5
43	0	21	183	Complexes	Synthesis and	2002		OXYGEN-ATOM TRANSFER; RAY	INORGANIC CHEMISTRY	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
44	4	5	167	Rock is a h	Coupled analysis	2002	flow damage; heterogeneous;	FRACTURED ROCK;	INTERNATIONAL JOURNAL OF ROCK	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.1	5
45	0	5	91	A +/-100 V	Electron emission	2002		SEMIINSULATING GAAS;	JOURNAL OF APPLIED PHYSICS	PHYSICS	SOLID STATE PHYSICS	6.1	5
46	13	8	282	We studied	Ultrasound	2002	articular cartilage; proteoglycans;	PHYSIOLOGICAL LOADING RATES;	JOURNAL OF BONE AND MINERAL	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.3	5
47	6	4	127	The effect	Germanium	2002	defects; single crystal growth;	NITROGEN-DOPED SILICON;	JOURNAL OF CRYSTAL GROWTH	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
48	9	6	66	Single crys	Polyol-mediated	2002	crystal morphology; low	NANOWIRES; GROWTH;	JOURNAL OF CRYSTAL GROWTH	PHYSICS	CRYSTALLOGRAPHY	6.1	4
49	9	0	78	This paper	Implementation of	2002	COTS; image processing;		JOURNAL OF INFRARED AND	NAVIGATION, DETECTION & COUNTERMEASURES	INFRARED DETECTION & DETECTORS	6.3	5
50	8	1	87	A new unsu	Multiresolution	2002	mathematic morphology;	SEGMENTATION	JOURNAL OF INFRARED AND	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.2	5
51	5	3	167	RNA extrac	Efficient isolation	2002	total RNA; isolation;	MYCOBACTERIUM;	JOURNAL OF MICROBIOLOGICAL	BIOLOGICAL & MEDICAL SCIENCES	MICROBIOLOGY	6.2	5
52	10	8	134	Based on a	Novel characte	2002	characterization; segment	LOW-DENSITY POLYETHYLENE	JOURNAL OF POLYMER SCIENCE	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
53	8	5	118	Capillary zo	Quantitative	2002	capillary zone electrophoresis;	BINDING ASSAYS; DNA-	JOURNAL OF SEPARATION	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	4
54	13	0	157	A V(m, t) le	Existence of V(m,	2002	V(m;t) vector; orthogonal Latin		JOURNAL OF STATISTICAL	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.1	4
55	7	4	148	According t	Characteristic	2002	calorimetry; characteristic	REVERSIBLE-REACTIONS;	JOURNAL OF THERMAL ANALYSIS	PHYSICS	THEORETICAL MATHEMATICS	6.1	5
56	11	5	91	The conver	Combined	2002	Fokker-Planck equation;	PLANCK EQUATION;	MATHEMATICS OF COMPUTATION	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	5
57	0	0	146	The effects	Effects of	2002			MICROELECTRONICS RELIABILITY	ELECTROTECHNOLOGY & FLUIDICS	ELECTRICAL & ELECTRONIC EQUIPMENT	6.1	4
58	0	2	136	Laser-indu	Laser-induced	2002		MOLECULES; ABSORPTION	MOLECULAR PHYSICS	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	5
59	0	10	57	Reaction o	A novel one-	2002		TRANSITION-METAL	NEW JOURNAL OF CHEMISTRY	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
60	8	3	196	Two new it	Simple algorithm	2002	cyclic radial shearing	FOURIER-TRANSFORM	OPTICAL ENGINEERING	PHYSICS	OPTICS	6.2	5

61	0	9	33	Substituent	Tuning the	2002		STEREOSELECTIVE SYNTHESIS;	ORGANIC LETTERS	CHEMISTRY	ORGANIC CHEMISTRY	6.1	5
62	0	1	77	We observ	First observati	2002		PARTICLES	PHYSICAL REVIEW LETTERS	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
63	0	9	118	We have ir	Nonclassical	2002		RESONANT TRANSPORT;	PHYSICS LETTERS A	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	5
64	0	0	143	Benzylation	All-plant fiber	2002			POLYMER COMPOSITES	MATERIALS	LAMINATES & COMPOSITE MATERIALS	6.2	5
65	0	5	164	The geneti	An improved	2002		MAXIMUM-LIKELIHOOD;	PROCEEDINGS OF THE NATIONAL	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.2	5
66	7	4	147	To identify	Identification of	2002	xenotransplantation; rejection;	ENDOTHELIAL-CELLS;	PROGRESS IN NATURAL SCIENCE	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.2	5
67	0	12	166	Total orgar	Burial of different	2002		ELEMENTAL CARBON; BLACK	QUATERNARY RESEARCH	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.2	5
68	16	21	291	Data on ca	Mortality and	2002	finless porpoise; Neophocaena	ASIAN COASTAL WATERS;	RAFFLES BULLETIN OF ZOOLOGY	ENVIRONMENTAL POLLUTION & CONTROL	ENVIRONMENTAL HEALTH & SAFETY	6.3	5
69	14	0	98	In this pape	Complete settling	2002	difference set; multiplier		SCIENCE IN CHINA SERIES A-	MATHEMATICAL & COMPUTER SCIENCES	THEORETICAL MATHEMATICS	6.1	3
70	4	0	124	A phenome	Modeling of the	2002	friction; voltage; control; model		SCIENCE IN CHINA SERIES A-	PHYSICS	ELECTRICITY & MAGNETISM	6.1	4
71	6	0	85	Modeling m	Mimic-biology	2002	crack; self-recovering;		SCIENCE IN CHINA SERIES E-	MATERIALS	PLASTICS	6.1	5
72	10	4	122	Testing hyp	Resampling	2002	Bartlett homogeneity test;	BOOTSTRAP METHODS;	STATISTICA SINICA	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	5
73	13	15	227	Polyploids	A bivalent	2002	bivalent pairing; full-sib family;	QUANTITATIVE TRAIT LOCUS;	THEORETICAL POPULATION	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
74	5	12	226	We evalua	Retrieval techniqu	2002	image retrieval; sonogram;	COMPUTER-AIDED	ULTRASOUND IN MEDICINE AND	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.3	5
75	0	6	207	Val45 is a l	Structures of	2002		3-DIMENSIONAL STRUCTURE;	ACTA CRYSTALLOGRAPHIC	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
76	12	12	129	According t	Geochemistry of	2002	carbonatite dykes; magmatic origin;	NB ORE DEPOSIT; INNER-	ACTA PETROLOGICA SINICA	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.1	5
77	13	2	232	Up to now,	Primary investiga	2002	geological fullerenes; coal	BOUNDARY; SEARCH	ACTA PETROLOGICA SINICA	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.2	5
78	13	5	152	The metho	Study on high	2002	quantum chemistry;	CORRELATION-ENERGY;	ACTA PHYSICO-CHIMICA SINICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.2	5
79	7	0	86	The cyclic	Electrochemical	2002	Er-Ni-Co alloy film; rare earths;		ACTA PHYSICO-CHIMICA SINICA	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
80	0	8	148	We develo	Retrieval of snow	2002		TOPOGRAPHIC NORMALIZATION	ANNALS OF GLACIOLOGY, VOL	EARTH SCIENCES & OCEANOGRAPHY	SNOW, ICE & PERMAFROST	6.3	5

81	4	0	117	The excited	A decay study of	2002	decay; gamma-ray; level;		APPLIED RADIATION AND ISOTOPES	NUCLEAR SCIENCE & TECHNOLOGY	RADIOACTIVITY, RADIOACTIVE WASTES &	6.1	5
82	11	2	242	A simple an	Purification and	2002	Aphis gossypii Glover;	QUANTITIES; RESISTANCE	ARCHIVES OF INSECT	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	4
83	9	7	151	This paper	Closed-loop	2002	model set validation; MIMO	FREQUENCY-DOMAIN DATA;	AUTOMATICA	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.1	5
84	13	7	85	The relative	Cluster analysis	2002	relative synonymous	USAGE BIAS; ARABIDOPSIS-	BIOSYSTEMS	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
85	10	5	270	Chickpea (	Seedling emergen	2002	seeding date; fertile pods; seed	FLOWERING TIME;	CANADIAN JOURNAL OF PLANT SCIENCE	AGRICULTURE	AGRONOMY, HORTICULTURE &	6.3	5
86	9	3	129	Nanocrysta	Synthesis and	2002	A. sol-gel techniquec; C.	SRBI2TA2O9 THIN-FILMS;	CERAMICS INTERNATIONAL	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
87	10	2	218	Typical flue	Application of	2002	coal gasification; flue gas;	SULFUR; SO2	CHEMICAL ENGINEERING	ENVIRONMENTAL POLLUTION & CONTROL	AIR POLLUTION & CONTROL	6.2	5
88	8	3	79	The adapti	Chaos synchron	2002	chaos; synchronization;	SYSTEMS; OSCILLATORS;	CHINESE JOURNAL OF CHEMISTRY	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
89	0	0	61	The time e	Wave packets	2002			CHINESE JOURNAL OF PHYSICS	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	4
90	5	0	66	The proble	An unconstr	2002	unconstrained optimization;		COMPUTERS & OPERATIONS	MATHEMATICAL & COMPUTER SCIENCES	OPERATIONS RESEARCH	6.2	5
91	7	12	111	A method f	Measurement of	2002	ascorbic acid; capillary	COLUMN AMPEROMETRIC	ELECTROPHORESIS	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.3	5
92	9	12	85	Neutral nic	New neutral	2002	styrene; late transition metal	TRANSFER RADICAL	EUROPEAN POLYMER JOURNAL	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
93	7	0	214	Traditionall	An investiga	2002	performance-based code;		FIRE TECHNOLOGY	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	STRUCTURAL ENGINEERING & BUILDING	6.2	5
94	0	0	226	We presen	Detection of	2002			GEOPHYSICS	EARTH SCIENCES & OCEANOGRAPHY	MINING ENGINEERING	6.3	5
95	5	14	76	Electrode b	Effects of	2002	biasing; radial electric field;	HIGH CONFINEMENT	IEEE TRANSACTIONS ON PLASMA SCIENCE	NUCLEAR SCIENCE & TECHNOLOGY	FUSION DEVICES (THERMONUCLEAR)	6.1	4
96	10	3	122	In this pape	Theoretical	2002	elastoplastic material; strain	FINITE THICKNESS	INTERNATIONAL JOURNAL OF	MATERIALS	PLASTICS	6.1	5
97	7	0	139	Pb1-xGexT	Microstructure	2002	Pb1-xGexTe; film; microstructure;		JAPANESE JOURNAL OF APPLIED PHYSICS	CHEMISTRY	INORGANIC CHEMISTRY	6.1	4
98	0	0	110	Phase tran	Phase transition	2002			JOURNAL OF APPLIED PHYSICS	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
99	7	3	137	In southwe	Permo-Carbonif	2002	Permo-Carboniferous;	YUNNAN; AFRICA; TIBET	JOURNAL OF ASIAN EARTH SCIENCES	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.2	4
100	10	0	115	In this pape	Nonlinear	2002	nonlinear analysis; mathematical		JOURNAL OF COLD REGIONS	PHYSICS	THERMODYNAMICS	6.2	5

101	14	5	107	in order to	A new branch	2002	mathematical program with	BILEVEL MATHEMATICAL	JOURNAL OF COMPUTATIONAL	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	4
102	8	2	29	A new Chir	A new species	2002	Collembola; Entomobryidae;	GENUS SINELLA	JOURNAL OF ENTOMOLOGICAL	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	4
103	9	2	113	Phosphoru	Phenolic resin	2002	phenolic resin carbon;	IRREVERSIBLE CAPACITY	JOURNAL OF INORGANIC	POWER PRODUCTION & ENERGY CONVERSION	ELECTROCHEMICAL ENERGY STORAGE	6.1	4
104	5	1	65	After gettin	Researc h of the	2002	bonding; Al; die-casting-bonding	SYSTEM	JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
105	11	2	63	A simple m	Synthesi s of CuS	2002	CuS particulate film; rod-like CuS	LANGMUIR MONOLAYERS	JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
106	8	0	128	High tempe	A neural network	2002	Si/C/N nano powder; dielectric		JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	4
107	0	5	86	Aligned mi	Electroc hemical	2002		TEMPLATE-SYNTHESIS;	JOURNAL OF MATERIALS	CHEMISTRY	POLYMER CHEMISTRY	6.1	4
108	15	19	190	Exposure t	Exposur e to	2002	acoustic energy; apoptosis; brain	PROGRAMMED CELL-DEATH;	JOURNAL OF NEUROTRAUMA	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.3	5
109	0	15	246	Previously	Inhibition by	2002		ISCHEMIC-HEART-DISEASE;	JOURNAL OF PHARMACOLOGY	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.2	5
110	0	18	202	The first tw	Dissociat ion	2002		NITRIC-OXIDE SYNTHASE;	JOURNAL OF THE AMERICAN	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
111	0	8	292	Objectives:	Protectiv e effect	2002		SMOOTH-MUSCLE;	JOURNAL OF THORACIC AND	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	5
112	6	1	165	Electropora	Transfer of anti-	2002	TFAR19; in situ electroporation;	MAMMALIAN-CELLS	LIFE SCIENCES	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.2	5
113	7	15	163	The conce	Concentr ations of	2002	normalisation; polychlorinated	HEAVY-METAL CONTAMINATIO	MARINE POLLUTION BULLETIN	ENVIRONMENTAL POLLUTION & CONTROL	PESTICIDES, POLLUTION & CONTROL	6.3	4
114	9	4	113	We have s	Electroc hemical	2002	nanostructures; crystal growth;	CADMIUM-SULFIDE;	MATERIALS RESEARCH	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
115	7	9	171	The preser	Inhibitory effects of	2002	interleukin-1 beta; carrageenan; c-	GLIAL ACTIVATION;	NEUROSCIENCE LETTERS	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
116	7	1	72	The propa	Propagat ion of	2002	elliptical Gaussian beam; misaligned	MATRICES	OPTICS AND LASER TECHNOLOGY	PHYSICS	OPTICS	6.1	5
117	0	6	117	The surfac	Thermop hysical	2002		SURFACE-TENSION;	PHILOSOPHICAL MAGAZINE LETTERS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
118	0	4	83	Using the M	Monte Carlo	2002		ISLAND GROWTH;	PHYSICAL REVIEW B	ELECTROTECHNOLOGY & FLUIDICS	LASERS & MASERS	6.1	5
119	0	0	126	Based on t	An accurate	2002			PHYSICS IN MEDICINE AND	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.2	5
120	6	10	148	Epidemic s	Epidemic spreadin	2002	percolation; correlation;	DIFFUSION-LIMITED	PHYSICS LETTERS A	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	4

121	8	8	92	We have m	Measure ment of	2002	e(+)e(-) collisions; phi radiative	PHENOMENOLO GICAL	PHYSICS LETTERS B	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
122	7	8	173	In this pape	In vitro study on	2002	5-fluorouracil; drug delivery systems;	BIODEGRADABL E POLYMERS;	POLYMERS FOR ADVANCED	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.1	4
123	6	1	126	Cinnamom	Cinphori n: a	2002	cinnamomin; cinphorin; protein	SEEDS	PROGRESS IN BIOCHEMISTRY AND	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
124	15	3	157	By using fo	Genome-scale	2002	noncoding region; organismal	SEQUENCES; DNA; FRACTALS	PROGRESS IN BIOCHEMISTRY AND	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
125	10	2	115	On the bas	Develop ment of	2002	ELISA-dienzyme substrate recycle	AVIDIN-BIOTIN; AMPLIFICATION	PROGRESS IN BIOCHEMISTRY AND	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.3	5
126	0	1	118	This paper	Elasto-viscoplas	2002		FLOW	ROCK MECHANICS AND ROCK	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.1	5
127	8	0	182	Let D be a	Geometr y of 2 x 2	2002	division ring; involution;		SCIENCE IN CHINA SERIES A-	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	5
128	8	15	283	Regional a	Geochro nological	2002	Dabie orogen; geochronology;	ULTRAHIGH-PRESSURE	SCIENCE IN CHINA SERIES D-EARTH	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.2	5
129	10	2	133	A micro-Ra	Raman analysis	2002	a-C/H(N) film; laser annealing;	SCATTERING; HYDROGEN	SOLID STATE COMMUNICATIONS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
130	0	10	89	Two sets o	Synthesi s and	2002		SPECTROSCOPI C PROPERTIES;	SYNTHESIS AND REACTIVITY IN	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
131	8	4	41	The oxidati	Solvent free	2002	oxidation; alcohols;	CHROMIC-ACID; ALDEHYDES;	TETRAHEDRON LETTERS	CHEMISTRY	INORGANIC CHEMISTRY	6.1	4
132	0	4	70	5-(p-Carbo	Novel complex	2002		PHOTOINDUCED ELECTRON-	TRANSITION METAL CHEMISTRY	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
133	6	7	166	Pig serum	Seroepid emiologi	2002	avian influenza viruses; pig	HONG-KONG; A VIRUSES;	VETERINARY MICROBIOLOGY	BIOLOGICAL & MEDICAL SCIENCES	MICROBIOLOGY	6.2	4
134	0	16	364	AIM: To stu	Clinical short-	2002		PERCUTANEOUS MICROWAVE	WORLD JOURNAL OF GASTROENTEROLOG	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.3	5
135	0	12	326	AIM: To ev	Clinical observati	2002		INTERFERON-GAMMA;	WORLD JOURNAL OF GASTROENTEROLOG	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
136	0	14	317	AIM: Hepat	Effects of the	2002		SMOOTH-MUSCLE CELLS;	WORLD JOURNAL OF GASTROENTEROLOG	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	5
137	7	0	138	The mecha	Effect of high	2002	thermal-shocking; precipitation-		ACTA METALLURGICA	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
138	7	0	96	The compr	High temperat	2002	MoSi2-SiC composite;		ACTA METALLURGICA	MATERIALS	LAMINATES & COMPOSITE MATERIALS	6.1	4
139	7	2	156	Sr1-xCaxR	Structure and	2002	FC magnetization; ZFC	SRRUO3; BEHAVIOR	ACTA METALLURGICA	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
140	5	2	175	AIM: To stu	Acetazol amide	2002	acetazolamide; neoplasm	AQUAPORIN-1; CELLS	ACTA PHARMACOLOGICA	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5

141	4	0	63	A new met	A new method	2002	atomic beam; interferometry;		ACTA PHYSICA SINICA	TEST EQUIPMENT, RESEAERCH FACILITIES &	HOLOGRAPHY	6.1	4
142	5	0	124	The depen	Experim ental	2002	laser plasma; holhraum;		ACTA PHYSICA SINICA	ELECTROTECHNOLOGY & FLUIDICS	LASERS & MASERS	6.1	4
143	7	1	174	A electron-	Alternati ng	2002	disordered system; electron	CHAIN	ACTA PHYSICA SINICA	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
144	12	5	139	By using hi	A high resolutio	2002	specular spin valves;	GIANT MAGNETORESIS	ACTA PHYSICA SINICA	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
145	9	4	55	Starting fro	Entropy of a	2002	black hole; entropy; thin film	NERNST THEOREM;	ACTA PHYSICA SINICA	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
146	0	2	49	The preser	Usefulne ss of	2002		OUTCOMES; GROWTH	AMERICAN JOURNAL OF CARDIOLOGY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	5
147	5	11	204	The efficac	Phase II study of	2002	docetaxel; epirubicin;	FRONT-LINE TREATMENT;	ANTI-CANCER DRUGS	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.3	4
148	5	1	91	This article	Post boronizin	2002	boride; gaseous boronizing; ion	BORIDE	APPLIED SURFACE SCIENCE	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
149	11	8	250	Glaciochen	Glacioch emical	2002	major ions; ice core; dust	CHEMICAL-COMPOSITION;	ATMOSPHERIC ENVIRONMENT	ATMOSPHERIC SCIENCES	METEOROLOGY	6.3	5
150	0	1	282	Backgroun	Breastfe eding	2002		DURATION	BIRTH-ISSUES IN PERINATAL CARE	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	4
151	13	4	226	The angle (	Use of angle of	2002	angle of repose; bulk densities; gas	GAS FLUIDIZATION;	CHEMICAL ENGINEERING	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
152	10	0	57	The quantu	Correlati on	2002	quantum-chemical descriptors;		CHEMICAL JOURNAL OF CHINESE	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
153	7	1	31	The photoc	Studies on	2002	aromatic fused ring; fused	FLUORESCENCE	CHEMICAL JOURNAL OF CHINESE	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.1	4
154	7	13	215	The conver	The UBI-QEP	2002	CO2 activation; UBI-QEP method;	RESOLVED PHOTOEMISSIO	CHEMICAL JOURNAL OF CHINESE	ENVIRONMENTAL POLLUTION & CONTROL	AIR POLLUTION & CONTROL	6.1	4
155	7	0	106	The influen	The influence	2002	nucleating agent; polypropylene;		CHEMICAL JOURNAL OF CHINESE	CHEMISTRY	POLYMER CHEMISTRY	6.1	4
156	0	12	126	The ground	Density functiona	2002		RESONANCE RAMAN-	CHEMICAL PHYSICS LETTERS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
157	7	1	29	The 1-arylo	One-pot synthesi	2002	1;4-diaryloxyacetyl thiosemicarbazide;	DERIVATIVES	CHINESE CHEMICAL LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
158	8	0	53	Two new c	Two new chromon	2002	Selaginella uncinata;		CHINESE CHEMICAL LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	3
159	6	6	148	The Zn-Cu	Adsorpti on	2002	MCM-41; carbon monoxide;	MOLECULAR-SIEVE	CHINESE CHEMICAL LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
160	5	3	133	An immune	An immune	2002	gold self-assembled	ARRAY IMMUNOSENSOR	CHINESE JOURNAL OF ANALYTICAL	NAVIGATION, DETECTION & COUNTERMEASURES	MISCELLANEOUS MATERIALS	6.1	4

161	7	0	68	The essent	Analysis of	2002	Veronica linariifolia;		CHINESE JOURNAL OF ANALYTICAL	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.1	5
162	6	1	107	The anodic	Voltamm etric	2002	ethambutol; glassy carbon electrode;	LIQUID-CHROMATOGRA	CHINESE JOURNAL OF ANALYTICAL	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
163	9	5	187	The selecti	Study on operatio	2002	benzene; selective hydrogenation;	AQUEOUS SALT SOLUTION;	CHINESE JOURNAL OF CATALYSIS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
164	7	0	124	A microrea	Study on reaction	2002	carbonyl sulfide; hydrolysis;		CHINESE JOURNAL OF CATALYSIS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
165	5	11	249	Backgroun	Tissue factor	2002	glioma; tissue factor; mRNA;	SMALL CELL-CARCINOMA;	CLINICAL BIOCHEMISTRY	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.2	5
166	9	11	206	Effects of u	CVD diamond	2002	microwave plasma chemical vapor	CHEMICAL-VAPOR-	DIAMOND AND RELATED	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
167	10	0	176	We evalua	Habitat evaluatio	2002	geographic information		ECOLOGICAL RESEARCH	BIOLOGICAL & MEDICAL SCIENCES	ECOLOGY	6.2	5
168	0	16	180	The photoc	Formatio n and	2002		PHOTOCATALYTI C	ENVIRONMENTAL SCIENCE &	ENVIRONMENTAL POLLUTION & CONTROL	WATER POLLUTION & CONTROL	6.1	5
169	18	12	128	The role of	Role of medial	2002	semantic processing;	INFERIOR PREFRONTAL	HIPPOCAMPUS	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
170	4	1	52	This paper	Anticontr ol of	2002	anticontrol; chaos; impulsive control	FEEDBACK	IEICE TRANSACTIONS ON	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.2	5
171	7	0	138	A survey w	Survey and	2002	China; environmental		INTERNATIONAL JOURNAL OF	ENVIRONMENTAL POLLUTION & CONTROL	ENVIRONMENTAL HEALTH & SAFETY	6.2	4
172	10	0	47	Based on s	Multi-Raman	2002	submillimeter wave laser		INTERNATIONAL JOURNAL OF	ELECTROTECHNOLOGY & FLUIDICS	LASERS & MASERS	6.1	5
173	7	14	119	With curren	5-Aminolev	2002	photodynamic detection;	INDUCED PORPHYRIN	INTERNATIONAL JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
174	6	0	166	Radix Astra	Chemica l analysis	2002	astragalosides; HPLC;		JOURNAL OF AGRICULTURAL AND	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.1	5
175	2	7	159	The crystal	Effect of PMR-	2002	crystallization; blends	POLY(PARA-PHENYLENE	JOURNAL OF APPLIED POLYMER	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
176	6	4	15	Chua's circ	A chemical	2002	nonlinear dynamics;	DYNAMICAL-SYSTEMS;	JOURNAL OF CHEMICAL	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.2	3
177	5	1	58	Both one-d	Two-phase	2002	kinetic undercooling;	FREE-BOUNDARY	JOURNAL OF DIFFERENTIAL	MATHEMATICAL & COMPUTER SCIENCES	THEORETICAL MATHEMATICS	6.1	4
178	10	19	256	Hybrid cop	Electroc hemical	2002	hybrid copper-cobalt	CHEMICALLY DERIVATIZED	JOURNAL OF ELECTROANALYTICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
179	9	1	82	A new robu	Robust estimator	2002	robust estimator; correlated	MODELS	JOURNAL OF GEODESY	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	4
180	8	5	162	A novel pol	Polyester imide-	2002	polyesterimide; bismaleimide	PHENYLMALEIMI DE-STYRENE	JOURNAL OF MACROMOLECULAR	MATERIALS	PLASTICS	6.1	5

181	9	10	359	A systemat	Compute r	2002	indentation creep test; particle-	METAL-MATRIX COMPOSITES;	JOURNAL OF MATERIALS SCIENCE	MATERIALS	PLASTICS	6.2	5
182	7	5	102	For 308L a	Hydroge n-	2002	austenitic stainless steel; hydrogen	EMBRITTLEMEN T; MECHANISM;	JOURNAL OF MATERIALS SCIENCE	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
183	11	6	114	Total of six	Ab initio study on	2002	harmonic vibrational	CHEMICAL-SHIFTS; C60O;	JOURNAL OF MOLECULAR	CHEMISTRY	ORGANIC CHEMISTRY	6.1	4
184	12	1	227	We examir	Saponin s from	2002	Platycodi radix; crude saponins;	STORAGE	JOURNAL OF NUTRITION	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
185	0	5	184	In this pape	Phase separatio	2002		POLYMER-POLYMER	JOURNAL OF PHYSICAL	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
186	0	1	140	Based on t	Study on the	2002		MOTOR	JOURNAL OF THE ACOUSTICAL	ELECTROTECHNOLOGY & FLUIDICS	LINE, SURFACE & BULK ACOUSTIC WAVE DEVICES	6.1	5
187	6	11	244	The N-met	N-methyl-D-	2002	glutamate; excitotoxicity;	RAT-BRAIN; NMDA	JOURNAL OF THE NEUROLOGICAL	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
188	2	0	100	A six-beam	A six-beam	2002	KrF laser		LASER AND PARTICLE BEAMS	ELECTROTECHNOLOGY & FLUIDICS	LASERS & MASERS	6.1	5
189	8	1	55	Aluminium-	Efficient activator	2002	activators; catalysts; late	COBALT	MACROMOLECULAR RAPID	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
190	6	5	54	Under the (	The first calculati	2002	4(++) glueball state; Monte Carlo	J/PSI RADIATIVE DECAYS;	MODERN PHYSICS LETTERS A	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
191	9	16	298	Previous st	The influence	2002	aluminum; hippocampus; long-	CALCIUM-CHANNEL	NEUROSCIENCE	BIOLOGICAL & MEDICAL SCIENCES	TOXICOLOGY	6.1	5
192	0	0	39	Problems a	Mathem atical	2002			NUOVO CIMENTO DELLA SOCIETA	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
193	0	1	151	The parotic	Retrogra de	2002		EXPANSION	OTOLARYNGOLOGY-HEAD AND NECK	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.2	5
194	0	3	129	The rate-de	Rate depende	2002		TI-NI ALLOYS; MARTENSITIC-	PHILOSOPHICAL MAGAZINE A-	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
195	0	14	243	In this pape	Memory effect in	2002		MOLECULAR-DYNAMICS	PHYSICAL REVIEW B	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
196	0	9	52	By constru	Exact solution	2002		MANY-BODY PROBLEM; ONE-	PHYSICAL REVIEW B	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	5
197	0	15	136	We have m	Improve d W	2002		GLOBAL QCD ANALYSIS; TOP-	PHYSICAL REVIEW D	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
198	6	1	80	X-ray photo	An XPS study of	2002	polystyrene; nanocomposites;	FIRE	POLYMER DEGRADATION AND	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
199	3	18	115	Fundamen	Recent advance	2002	photocatalysis; mechanisms;	VISIBLE-LIGHT IRRADIATION;	PROGRESS IN CHEMISTRY	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
200	15	0	214	The CCMD	Chinese classifica	2002	Chinese classification of		PSYCHOPATHOLOGY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5

201	10	11	270	Purpose: T	Luminal characte	2002	central retinal artery; central	HUMAN LAMINA-CRIBROSA; AGE-	RETINA-THE JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
202	0	8	144	This article	Envelop e solitary	2002		SINE-GORDON EQUATION;	STUDIES IN APPLIED MATHEMATICS	PHYSICS	MECHANICS	6.1	5
203	5	5	23	The microv	Rapid microwa	2002	microwave irradiation;	CRYSTAL-STRUCTURE;	SYNTHETIC COMMUNICATIONS	CHEMISTRY	RADIATION & NUCLEAR CHEMISTRY	6.1	4
204	8	10	134	A new chei	Chemilu minesce	2002	chemiluminescenc e; flow-injection	SPECTROPHOT OMETRIC	TALANTA	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.2	5
205	4	8	118	The friction	Frictional contact	2002	interfaces; coatings; contacts;	FINITE-ELEMENT ANALYSIS;	THIN SOLID FILMS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
206	10	2	121	By using th	Effects of can	2002	TiAl base alloy; thermal	GAMMA-TITANIUM	TRANSACTIONS OF NONFERROUS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
207	5	0	159	The effect	Effect of coating	2002	nickel aluminides; coatings; aero-		TRANSACTIONS OF NONFERROUS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
208	13	8	249	With an att	Effect of surface	2002	surface state; titanium dioxide;	VISIBLE-LIGHT IRRADIATION;	TRANSACTIONS OF NONFERROUS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
209	7	3	131	A ZA-27 all	Sliding wear and	2002	ZA-27 alloy; intermetallic	HIGH-STRENGTH;	TRANSACTIONS OF NONFERROUS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
210	5	0	28	In this pape	Oscillatio ns for	2002	difference equations; positive		ZEITSCHRIFT FUR ANALYSIS UND IHRE	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	4
211	7	4	81	Lung functi	Pulmona ry iron	2002	iron overload; small airway	FUNCTION ABNORMALITIES;	ACTA HAEMATOLOGICA	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
212	0	16	262	A novel hyp	On-line coupling	2002		PLASMA-MASS SPECTROMETRY	ANALYTICAL CHEMISTRY	BIOLOGICAL & MEDICAL SCIENCES	TOXICOLOGY	6.2	5
213	0	9	105	In contrast	Binary constrain	2002		SYMMETRY CONSTRAINT;	ANZIAM JOURNAL	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	5
214	13	6	138	Relatively l	Periodic microstr	2002	laser-induced periodic surface	SURFACE-STRUCTURES;	APPLIED SURFACE SCIENCE	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
215	0	5	255	Aims: (1) T	Use of tonsil	2002		APNEA; CHILDREN;	ARCHIVES OF DISEASE IN	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
216	9	12	230	Transcripti	Identifica tion and	2002	novel zinc finger genes; heart	TRANSCRIPTION FACTORS;	BIOCHEMICAL AND BIOPHYSICAL	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
217	5	2	270	The preser	Characte ristics of	2002	analgesia; electroacupunctur	MORPHINE; RAT	BRAIN RESEARCH	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
218	7	6	56	In an effort	Unexpec ted alpha-	2002	neighboring group participation	HIGHLY EFFICIENT;	CARBOHYDRATE RESEARCH	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	4
219	0	14	136	Glutathione	A semisynt	2002		SYNTHETIC ORGANOSELENI	CHEMISTRY & BIOLOGY	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
220	20	0	93	In this pape	A new Adaptive	2002	progressive unequal error		CHINESE JOURNAL OF ELECTRONICS	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.2	5

221	12	2	96	In this pape	Weighted bit soft	2002	direct sequence code-division	CDMA SYSTEMS	CHINESE JOURNAL OF ELECTRONICS	COMMNICATIONS	TELEMETRY	6.2	5
222	8	5	89	In this pape	Digital communi	2002	chaotic secure communication;	SECURE COMMUNICATIO	CHINESE JOURNAL OF ELECTRONICS	COMMNICATIONS	TELEMETRY	6.2	4
223	13	0	197	Diethyl alur	Investeg ation of	2002	diethyl aluminum azide (DEAA);		CHINESE JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
224	11	7	80	Ab initio op	Theoreti cal	2002	solvent softness; quantitative	SURFACE ELECTROSTATIC	CHINESE JOURNAL OF INORGANIC	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
225	6	3	85	A balanced	Two-dimensio	2002	balanced sampling plan; two	GROUP DIVISIBLE	COMMUNICATIONS IN STATISTICS-	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.1	5
226	8	3	212	Backgroun	Karyotypi ng of	2002	comparative genomic	HUMAN-CHROMOSOMES	CYTOMETRY	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.2	4
227	7	0	157	A multi-targ	Intelligen t optimal	2002	FACTS; intelligent control; optimal		ELECTRIC POWER SYSTEMS	POWER PRODUCTION & ENERGY CONVERSION	ELECTRIC POWER PRODUCTION &	6.2	4
228	0	0	52	A new DRE	A novel DRB1*0	2002			EUROPEAN JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
229	11	9	124	Adsorption	Adsorpti on and	2002	Chinese soils; fluoride	GROUNDWATER; ALUMINUM;	FLUORIDE	ENVIRONMENTAL POLLUTION & CONTROL	WATER POLLUTION & CONTROL	6.1	5
230	8	7	213	BACKGRO	A prospecti	2002	anaesthesia; conscious	IN-VITRO FERTILIZATION;	HUMAN REPRODUCTION	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.3	5
231	0	0	81	In this pape	The inverted	2002			IIE TRANSACTIONS	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.1	5
232	12	7	183	This study	Discorda nce	2002	dipyridmole; Kawasaki disease;	LYMPH-NODE SYNDROME;	INTERNATIONAL JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
233	0	0	84	The MRF c	Protein-F e MR	2002			INTERNATIONAL JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
234	0	0	190	Floral orga	Floral organog	2002			ISRAEL JOURNAL OF PLANT SCIENCES	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
235	9	1	139	A method f	Interactio n	2002	interaction process; ionic	SENSOR	JOURNAL OF BIOCHEMICAL AND	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.1	5
236	6	3	162	The antimi	Antibact erial	2002	chitosan; waterborne	CELL-WALL; RECOVERY;	JOURNAL OF ENVIRONMENTAL	BIOLOGICAL & MEDICAL SCIENCES	MICROBIOLOGY	6.2	5
237	0	5	135	Let E be ar	Iterative approxim	2002		STRONG-CONVERGENCE;	JOURNAL OF MATHEMATICAL	MATHEMATICAL & COMPUTER SCIENCES	THEORETICAL MATHEMATICS	6.1	4
238	0	4	76	Five new d	Five new diterpen	2002		TU-JIN-PI; ACID-B;	JOURNAL OF NATURAL	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	4
239	12	17	193	The Dabie	Fluid evolution	2002	UHP metamorphism;	ULTRAHIGH-PRESSURE	JOURNAL OF PETROLOGY	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.1	5
240	0	1	66	A method f	Preparati on of Pd-	2002		IMPLANTATION	JOURNAL OF RADIOANALYTICAL	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5

241	0	13	177	We synthe:	Surfacta nt-	2002		ANIONIC AMPHIPHILES;	LANGMUIR	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
242	4	2	119	Multi-color	Multi- color	2002	glasses; ceramics; defects;	FEMTOSECOND LASER	MATERIALS RESEARCH	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
243	10	9	128	The morph	Simulatio n of	2002	computer simulation;	COMPUTER-SIMULATION;	MATERIALS SCIENCE AND ENGINEERING A-	PHYSICS	CRYSTALLOGRAPHY	6.1	4
244	11	13	103	The conditi	On the transition	2002	Harper-Dorn creep; grain	HARPER-DORN CREEP; POWER-	MATERIALS SCIENCE AND ENGINEERING A-	PHYSICS	CRYSTALLOGRAPHY	6.1	4
245	7	3	60	From the L	The multi value of	2002	QHD-I model; effective nucleon	DERIVATIVE COUPLING	MODERN PHYSICS LETTERS A	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
246	6	0	31	A new spe	A new Dictyosp	2002	banana; hyphomycete;		MYCOTAXON	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
247	8	1	126	In this work	Transmi ssion	2002	heavy-metal oxide (HMO) glass;	METAL	NUCLEAR INSTRUMENTS &	NUCLEAR SCIENCE & TECHNOLOGY	NUCLEAR INSTRUMENTATION	6.1	5
248	10	9	168	The preser	The effect of	2002	Morinda officinalis; desipramine;	RATE 72-SECOND	PHARMACOLOGY BIOCHEMISTRY AND	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.2	5
249	0	7	78	We analyze	Thermal propertie	2002		ZERO-POINT ENERGY;	PHYSICAL REVIEW A	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	4
250	0	9	102	In this Brief	Kawasak i-type	2002		ANISOTROPIC ELASTIC	PHYSICAL REVIEW E	PHYSICS	CRYSTALLOGRAPHY	6.1	4
251	6	15	114	Crossover	Crossov er from	2002	quantum tunneling; phase	BIAXIAL SPIN SYSTEM;	PHYSICS LETTERS A	PHYSICS	ELECTRICITY & MAGNETISM	6.1	4
252	5	1	176	The Kowlo	Develop ment of	2002	bridges; noise; rail track design	NOISE	PROCEEDINGS OF THE INSTITUTION OF	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	SURFACE TRANSPORTATION &	6.2	5
253	0	2	168	The Ca II K	Cyclic variation	2002		SPACED DATA	SOLAR VARIABILITY AND SOLAR PHYSICS	ATMOSPHERIC SCIENCES	ATMOSPHERIC PHYSICS	6.1	5
254	0	4	30	2-Arylbenz	Conveni ent	2002		SCHIFFS BASES; POLY<STYRENE(	SYNTHETIC COMMUNICATIONS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
255	7	10	190	Graft polyn	Covalent attachme	2002	self-assembled monolayers; gold;	PLASMA; FILMS; POLYETHYLENE;	THIN SOLID FILMS	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
256	15	7	233	It has been	Expressi on of	2002	Citrus junos; Poncirus trifoliata;	SUGAR-BEET; IRON-	ACTA BOTANICA SINICA	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
257	7	12	124	Green fluo	Gene transfer	2002	electroporation; GFP; Oryza sativa;	ORYZA-SATIVA L; IMMATURE	ACTA BOTANICA SINICA	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
258	0	0	84	The crystal	Tetra-n-butylam	2002			ACTA CRYSTALLOGRAPHIC	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
259	0	4	84	The Zn-II a	[5-amino-6,8-	2002		POLYPYRIDYL BRIDGING	ACTA CRYSTALLOGRAPHIC	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
260	0	1	62	The title co	2,2 '-diamino-	2002		DNA	ACTA CRYSTALLOGRAPHIC	CHEMISTRY	POLYMER CHEMISTRY	6.1	5

261	7	0	32	Sharp estir	Sharp estimate	2002	Bergman spaces; Besov spaces;		ACTA MATHEMATICA SINICA-ENGLISH	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	5
262	9	3	154	Let {X, X-(r	LIL and the	2002	strong approximation;	ITERATED LOGARITHM;	ACTA MATHEMATICA SINICA-ENGLISH	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	5
263	7	4	116	A method i	Voltamm etric	2002	voltammetry; estrogen; Nafion;	SWEEP POLAROGRAPHY	ANALYTICA CHIMICA ACTA	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
264	0	6	188	An irrevers	Influence of	2002		REGENERATIVE LOSSES;	APPLIED ENERGY	PHYSICS	THERMODYNAMICS	6.1	5
265	7	2	78	The travelir	The concave	2002	soliton; peakson; integrable system;	SHALLOW-WATER	APPLIED MATHEMATICS AND	EARTH SCIENCES & OCEANOGRAPHY	PHYSICAL & DYNAMIC OCEANOGRAPHY	6.1	4
266	0	2	120	Sr4Al14O2	Anomalo us	2002		STRONTIUM ALUMINATE	APPLIED PHYSICS LETTERS	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
267	11	11	125	In aiming to	Construc tion of	2002	swine; chromosomes 2;	QUANTITATIVE TRAIT LOCI;	ASIAN-AUSTRALASIAN	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.2	5
268	10	3	209	It is shown	Collapsin g	2002	accretion : accretion disks;	FIELDS; TURBULENCE;	ASTRONOMY & ASTROPHYSICS	ASTRONOMY & ASTROPHYSICS	ASTRONOMY	6.1	5
269	7	5	124	The curren	Mulberro side F	2002	Morus alba; Moraceae;	HYPOGLYCEMIC ACTIVITY;	BIOLOGICAL & PHARMACEUTICAL	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.1	5
270	10	9	331	Objective T	Relation ship	2002	organophosphorus pesticide	OXIDATIVE STRESS;	BIOMEDICAL AND ENVIRONMENTAL	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
271	0	5	179	Field bioas	Compari son of	2002		SOGATELLA-FURCIFERA;	BULLETIN OF ENTOMOLOGICAL	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
272	0	4	65	Photolumir	Photolu minesce	2002		QUANTUM DOTS;	CANADIAN JOURNAL OF PHYSICS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
273	0	7	106	In this stud	Chemica l	2002		BELOUSOV-ZHABOTINSKY	CHEMICAL PHYSICS LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
274	9	7	206	The eastwa	Study on crustal	2002	eastern Qinghai-Xizang plateau;	POSITIONING SYSTEM	CHINESE JOURNAL OF GEOPHYSICS-	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.1	5
275	6	5	237	Objective T	Mechani sm of	2002	liver neoplasms; 5-fluourouracil; nitric	NITRIC-OXIDE SYNTHASE;	CHINESE MEDICAL JOURNAL	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.2	5
276	7	3	152	Objective T	Diagnosi s and	2002	cervical spinal cord;	CERVICOMEDUL LARY JUNCTION;	CHINESE MEDICAL JOURNAL	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
277	10	12	275	Objective T	Recombi nant	2002	human B7.2/CD86;	TUMOR MEMBRANE	CHINESE MEDICAL JOURNAL	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
278	5	4	316	Objective T	Samariu m-153-	2002	samarium-153-EDTMP;	SKELETAL METASTASES;	CHINESE MEDICAL JOURNAL	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.2	4
279	0	1	82	We presen	Isotopic distributi	2002		AL-27	CHINESE PHYSICS LETTERS	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
280	0	5	78	The princip	Effects of	2002		RECORDING MEDIA;	CHINESE PHYSICS LETTERS	TEST EQUIPMENT, RESEAERCH FACILITIES &	HOLOGRAPHY	6.1	5

281	0	4	123	Low-lying s	Transition of the	2002		FEW-ELECTRON QUANTUM;	CHINESE PHYSICS LETTERS	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	5
282	0	6	107	Contactles:	Modulation	2002		FRANZ-KELDYSH OSCILLATIONS;	CHINESE PHYSICS LETTERS	PHYSICS	SOLID STATE PHYSICS	6.1	4
283	7	10	96	Poly (meth	Preparation and	2002	gas chromatography;	CAPILLARY GAS-CHROMATOGRA	CHROMATOGRAPHIA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
284	5	6	65	We propos	Test of nonlocali	2002	nonlocality; entangled state;	QUANTUM NONLOCALITY;	COMMUNICATIONS IN THEORETICAL	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	5
285	9	14	95	A consister	Nuclear effect	2002	K-factor; Drell-Yan process; deep	INELASTIC MUON	COMMUNICATIONS IN THEORETICAL	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
286	3	3	64	We presen	Analytical result	2002	supercurrent; superconductor/qu	TRANSPORT; STATES;	COMMUNICATIONS IN THEORETICAL	PHYSICS	SOLID STATE PHYSICS	6.1	5
287	0	2	81	In this work	Some transcen	2002		GOSS GAMMA-FUNCTION	COMPTES RENDUS MATHEMATIQUE	MATHEMATICAL & COMPUTER SCIENCES	THEORETICAL MATHEMATICS	6.1	5
288	9	3	161	Calcineurir	Studies of	2002	calcineurin; regulatory subunit;	PROTEIN PHOSPHATASE;	DRUG DEVELOPMENT	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.2	5
289	10	9	171	The objecti	Correlates of	2002	maternal characteristics;	BREAST-CANCER RISK;	EUROPEAN JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.2	5
290	6	1	66	Second an	Second-order	2002	far infrared; ferroelectric	FILMS	FERROELECTRICS	ELECTROTECHNOLOGY & FLUIDICS	ELECTROOPTICAL & OPTOELECTRONIC	6.1	4
291	5	0	71	A new diter	Structure of a	2002	Fritillaria hupehensis;		FITOTERAPIA	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	4
292	6	6	121	Mammary	Metachronous	2002	metaplastic carcinoma;	BREAST CARCINOMAS;	HUMAN PATHOLOGY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
293	8	3	93	A novel scl	Enhanced	2002	fiber-optic sensors; low-	RESOLUTION; SYSTEM;	IEEE PHOTONICS TECHNOLOGY	ELECTROTECHNOLOGY & FLUIDICS	ELECTROOPTICAL & OPTOELECTRONIC	6.2	4
294	21	11	162	We presen	Automatic image	2002	Bayesian learning; classifier	SKEW ANGLE DETECTION;	IEEE TRANSACTIONS ON IMAGE	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.3	5
295	10	2	150	To achieve	Bidirectional	2002	model-based segmentation;	RECOGNITION; TEMPLATES	IEEE TRANSACTIONS ON PATTERN	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.3	5
296	10	8	108	The self as	Helical complex	2002	crystal structures; silver(I)	DIMENSIONAL COORDINATION	INORGANICA CHIMICA ACTA	CHEMISTRY	INORGANIC CHEMISTRY	6.1	4
297	15	0	133	A novel dyr	A novel dynamic	2002	dynamic voltage restorer; PWM		INTERNATIONAL JOURNAL OF	ELECTROTECHNOLOGY & FLUIDICS	ELECTRICAL & ELECTRONIC EQUIPMENT	6.1	5
298	10	10	174	In this stud	Random response	2002	hysteretic system; integrable Duhem	RANDOM VIBRATION;	INTERNATIONAL JOURNAL OF NON-	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.1	4
299	9	0	135	A Pb(Zr, Ti	Preparation of	2002	electrostatic spray; lead zirconate		JAPANESE JOURNAL OF APPLIED PHYSICS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
300	0	0	158	Compton s	The converge	2002			JOURNAL OF APPLIED PHYSICS	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	5

301	3	2	161	This study	Quantitation of the	2002	wogonin; wogonin-7 beta-D-	ZUTPHEN; CANCER	JOURNAL OF CHROMATOGRAPHY	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
302	7	13	267	The aim of	Influence of static	2002	biomonitor; biomonitoring;	NATURAL FACTORS	JOURNAL OF EXPERIMENTAL	BIOLOGICAL & MEDICAL SCIENCES	ECOLOGY	6.1	5
303	0	1	72	In this pape	Numerical	2002		ALGORITHM	JOURNAL OF GLOBAL	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	5
304	6	0	161	Much resea	Research on	2002	carbon steel; continuous		JOURNAL OF IRON AND STEEL	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
305	6	16	169	TALL-1 is a	Identification of	2002	B lymphocytes; autoimmunity; IL-	SYSTEMIC-LUPUS-	JOURNAL OF LEUKOCYTE	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
306	0	5	88	The wear b	Wear behavior	2002		HIGH-PRESSURE;	JOURNAL OF MATERIALS	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
307	0	9	260	Films made	Effect of lipase	2002		SURFACE MODIFICATION;	JOURNAL OF MATERIALS SCIENCE-	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	4
308	7	2	103	A novel opt	High accuracy	2002	optical bistable devices; March-	TEMPERATURE; STRAIN	JOURNAL OF NONLINEAR OPTICAL	PHYSICS	FIBER OPTICS & INTEGRATED OPTICS	6.2	4
309	8	8	75	In this pape	Examination on	2002	crystal fields; optical properties;	D-ORBITAL THEORY; SPIN-	JOURNAL OF PHYSICS AND	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
310	5	12	334	Objective.	Behcet's disease	2002	Chinese; Behcet's disease;	PATHERGY TEST; BRITISH	JOURNAL OF RHEUMATOLOGY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
311	0	4	136	The respor	Stochastic	2002		RANDOM VIBRATION;	JOURNAL OF SOUND AND VIBRATION	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.1	4
312	0	4	125	Hydroquino	Preparation and	2002		POLYANILINE; INCLUSION;	MACROMOLECULES	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
313	10	1	85	In this desi	Magneto-optical	2002	Faraday effect; critical angle	IMPROVEMENT	MEASUREMENT SCIENCE &	ELECTROTECHNOLOGY & FLUIDICS	ELECTROOPTICAL & OPTOELECTRONIC	6.1	5
314	11	12	157	Nasophary	Chromosomal	2002	nasopharyngeal cancer;	PERIPHERAL-BLOOD	MUTATION RESEARCH-	BIOLOGICAL & MEDICAL SCIENCES	RADIOBIOLOGY	6.2	5
315	0	12	150	First order	Rotational	2002		EXTRA DIMENSION;	NUCLEAR PHYSICS B	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
316	9	3	63	A theoretic	Theoretical	2002	theoretical model; active mode-	SELF-PHASE MODULATION;	OPTICS COMMUNICATIONS	PHYSICS	OPTICS	6.1	4
317	0	6	122	Conformati	Theoretical study	2002		LIGHT-EMITTING-DIODES;	PHYSICAL CHEMISTRY	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
318	16	14	94	An optimize	Optimized	2002	effective potential; functional	BACKGROUND FIELD METHOD;	PHYSICS LETTERS B	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	4
319	7	2	174	Floral orga	Floral organog	2002	Chloranthaceac; Chloranthus; floral	ANGIOSPERMS; ORIGIN	PLANT SYSTEMATICS AND	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
320	11	1	126	By using sc	Imaging of	2002	scanning near-field optical	FORCE	PROGRESS IN NATURAL SCIENCE	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	4

321	10	0	51	We obtain	Global attractivit	2002	delay differential equation;		QUARTERLY OF APPLIED	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	3
322	0	6	180	The effects	Effects of	2002		BEET SEED; GROWTH; YIELD;	SEED SCIENCE AND TECHNOLOGY	AGRICULTURE	AGRICULTURAL CHEMISTRY	6.1	5
323	9	8	111	In order to	Ionic conducti	2002	lithium ion batteries; graphite	IN-SITU RAMAN; NEGATIVE	SOLID STATE IONICS	PHYSICS	SOLID STATE PHYSICS	6.2	5
324	7	0	109	This paper	Simultan eous	2002	quality control; joint confidence		STATISTICAL PAPERS	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.1	5
325	10	8	161	Bisphenol A	A new competiti	2002	bisphenol A; polyclonal	LIQUID-CHROMATOGRA	TALANTA	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.3	4
326	11	1	245	We investi	The impact of	2002	stream; benthic macroinvertebrate	WATER	WATER RESEARCH	ENVIRONMENTAL POLLUTION & CONTROL	WATER POLLUTION & CONTROL	6.2	5
327	7	12	177	PCL6, PCL	Analysis of	2002	PCL6; PCL7; YJL084c;	CYCLIN-DEPENDENT	ACTA BIOCHIMICA ET BIOPHYSICA SINICA	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
328	11	3	124	The relatio	Conform ation	2002	arrowhead protease	FLUORESCENCE ; MUTAGENESIS;	ACTA BIOCHIMICA ET BIOPHYSICA SINICA	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
329	9	13	150	Bulk Nd14F	Underco oling-	2002	rare earth alloys; rapid solidification;	PHASE SELECTION;	ACTA MATERIALIA	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
330	10	0	140	Alginate-Cl	Ion replacem	2002	ion replacement gels; alginate;		ACTA PHYSICO-CHIMICA SINICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
331	6	0	101	Polyaniline	Preparati on and	2002	polyaniline; barium titanate; in situ;		ACTA PHYSICO-CHIMICA SINICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
332	6	1	157	In this pape	The spring	2002	spring monsoon; seasonal variation;	FIELD	ADVANCES IN ATMOSPHERIC	ATMOSPHERIC SCIENCES	METEOROLOGY	6.2	5
333	8	0	111	For varietie	Definabl e	2002	finite basis; congruence		ALGEBRA UNIVERSALIS	MATHEMATICAL & COMPUTER SCIENCES	THEORETICAL MATHEMATICS	6.1	5
334	8	0	244	Under norn	As-cast ageing of	2002	aluminum alloys; as-cast ageing;		ALUMINUM ALLOYS 2002: THEIR	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
335	0	15	269	Cleft lip wit	Genome scan for	2002		COMPLEX SEGREGATION	AMERICAN JOURNAL OF HUMAN	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.2	4
336	6	1	223	The interfa	Corrosio n study	2002	autoclave; shear force; stress	METALLIZATION	APPLIED SURFACE SCIENCE	MATERIALS	METALLURGY & METALLOGRAPHY	6.2	5
337	0	5	20	In this note	A counter-	2002		GENERAL LINEAR-	ARCHIV DER MATHEMATIK	MATHEMATICAL & COMPUTER SCIENCES	THEORETICAL MATHEMATICS	6.1	3
338	6	16	170	Immunose	Immuno sensor	2002	immunosensors; microbalance;	MURINE MONOCLONAL-	BIOSENSORS & BIOELECTRONICS	NAVIGATION, DETECTION & COUNTERMEASURES	MISCELLANEOUS MATERIALS	6.1	4
339	0	2	290	The establi	Establish ment,	2002		ONCOGENES; CANCER	CANCER GENETICS AND CYTOGENETICS	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	4
340	0	2	119	The solubil	Phase chemistr	2002		AMINO-ACID COMPLEXES	CHEMICAL PAPERS-CHEMICKE ZVESTI	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5

341	6	9	166	We reviewe	Tracheo bronchial	2002	stents; therapeutic bronchoscopy;	HONG-KONG EXPERIENCE;	CHEST	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.3	5
342	7	11	20	The interm	Reductiv e	2002	samarium; mercuric	DIMERIZATION CYCLIZATION;	CHINESE JOURNAL OF CHEMISTRY	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
343	9	1	134	The title co	Synthesi s, crystal	2002	alpha-hydroxyphosphinic	ESTERS	CHINESE JOURNAL OF STRUCTURAL	CHEMISTRY	ORGANIC CHEMISTRY	6.1	5
344	8	2	112	The photor	Ab initio research	2002	3-hydroxy acrolein; isomerization;	PROTON-TRANSFER;	CHINESE JOURNAL OF STRUCTURAL	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
345	11	13	119	We presen	Recurren ce	2002	closed-orbit theory; recurrence	PHOTODETACH MENT CROSS-	CHINESE PHYSICS	PHYSICS	ELECTRICITY & MAGNETISM	6.1	5
346	11	6	68	An optically	Optically fixed	2002	photorefractive effect; two-centre	NONVOLATILE HOLOGRAPHIC	CHINESE PHYSICS	PHYSICS	OPTICS	6.1	5
347	9	1	145	Preliminary	Adsorpti on and	2002	Bacillus licheniformis;	BIOMASS	CHINESE SCIENCE BULLETIN	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.1	4
348	4	0	223	The field in	Chronolo gy of the	2002	Dali Man; stratigraphy;		CHINESE SCIENCE BULLETIN	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
349	8	0	146	The quanti	Quantitat ive	2002	quantitative structure-property		COLLOID AND POLYMER SCIENCE	CHEMISTRY	POLYMER CHEMISTRY	6.1	4
350	0	0	75	Let format	Formatio n	2002			COMMUNICATIONS IN ALGEBRA	MATHEMATICAL & COMPUTER SCIENCES	THEORETICAL MATHEMATICS	6.1	5
351	9	0	187	This paper	Hierarchi cal slice	2002	slicing; topological hierarchy; multiple-		COMPUTERS IN INDUSTRY	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	4
352	4	17	326	Backgroun	Morphol ogy,	2002	hepatocyte; culture; bioartificial	ADULT-RAT HEPATOCYTES;	DIGESTIVE SURGERY	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
353	0	0	129	The effect	The effect of	2002			ENERGY & FUELS	MATERIALS	LUBRICATES & HYDRAULIC FLUIDS	6.1	5
354	13	10	178	In conventi	Enhance d taxane	2002	Taxus chinensis; taxoid production;	SUSPENSION-CULTURES;	ENZYME AND MICROBIAL	BIOLOGICAL & MEDICAL SCIENCES	MICROBIOLOGY	6.1	5
355	6	5	197	We examin	Nonshiv ering	2002	nonshivering thermogenesis;	HEAT-PRODUCTION;	FOLIA ZOOLOGICA	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.2	5
356	4	15	366	Naturally o	Localizati on of	2002	mutant mice; efferents;	GENE-RELATED-PEPTIDE; GABA-	HEARING RESEARCH	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
357	9	3	98	A novel me	A method	2002	eddy currents; gradient fields;	GRADIENT COIL DESIGN	IEEE TRANSACTIONS ON APPLIED	BIOLOGICAL & MEDICAL SCIENCES	RADIOBIOLOGY	6.1	5
358	0	7	95	The necess	Schur stability	2002		FREQUENCY-DOMAIN	IEEE TRANSACTIONS ON CIRCUITS AND	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	4
359	0	0	19	Amines rea	A new method	2002			INDIAN JOURNAL OF CHEMISTRY	CHEMISTRY	ORGANIC CHEMISTRY	6.1	3
360	4	0	120	There exist	A CORBA-	2002	CORBA; CSCW; dynamic alliance		INTERNATIONAL JOURNAL OF	MATHEMATICAL & COMPUTER SCIENCES	COMPUTER SYSTEMS	6.2	4

361	0	3	139	The effects	Effects of	2002		SUPERADIABATI C COMBUSTION;	INTERNATIONAL JOURNAL OF HEAT	PROPULSION, ENGINES & FUELS	COMBUSTION & IGNITION	6.1	5
362	7	4	89	A strain of	Streptos porangiu	2002	Streptosporangiu m subroseum sp	DNA; CLASSIFICATION	INTERNATIONAL JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
363	10	13	123	In this artic	The external	2002	morphology; phase separation;	FLEXIBLE POLYMERS;	JOURNAL OF APPLIED POLYMER	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
364	6	1	50	A new thiop	New thiophen	2002	Echinops grijisii; compositae;	ROOTS	JOURNAL OF ASIAN NATURAL	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	4
365	13	0	49	Phlegmariu	Three new	2002	Huperzia serrata; Lycopodium		JOURNAL OF ASIAN NATURAL	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	4
366	5	0	111	Icariin was	Purificati on of	2002	Epimedium segittatum;		JOURNAL OF CHROMATOGRAPHY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	3
367	7	0	158	As a scalal	An effective	2002	feedback control; DiffServ; fairness;		JOURNAL OF COMPUTER SCIENCE	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.2	5
368	7	0	126	A smoke si	A hybrid model	2002	particle system; density function;		JOURNAL OF COMPUTER SCIENCE	ENVIRONMENTAL POLLUTION & CONTROL	AIR POLLUTION & CONTROL	6.2	5
369	7	15	147	Regional lu	Effects of	2002	natural radioactivity;	PARTICLE DEPOSITION;	JOURNAL OF ENVIRONMENTAL	BIOLOGICAL & MEDICAL SCIENCES	RADIOBIOLOGY	6.1	5
370	10	0	264	Loess Plate	Agricultu ral	2002	Loess Plateau; sustainable		JOURNAL OF ENVIRONMENTAL	AGRICULTURE	AGRICULTURAL ENGINEERING	6.2	5
371	8	0	100	A novel, sir	Reverse d flow	2002	chlorine dioxide; chlorophenol red;		JOURNAL OF ENVIRONMENTAL	ENVIRONMENTAL POLLUTION & CONTROL	WATER POLLUTION & CONTROL	6.1	5
372	0	0	176	Glasses of	Processi ng	2002			JOURNAL OF MATERIALS SCIENCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
373	10	13	157	Ab initio mo	Structure s and	2002	nitrogen cluster; ab initio; density	CARBON NITROGEN	JOURNAL OF MOLECULAR	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	5
374	8	21	193	Aberrant m	Neural (N-)	2002	N-cadherin; cell adhesion	CENTRAL-NERVOUS-	JOURNAL OF NEUROSCIENCE	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.2	5
375	8	16	159	4,4'-Bipyrid	Synthesi s,	2002	clusters; crystal structures;	NONLINEAR-OPTICAL	JOURNAL OF ORGANOMETALLIC	CHEMISTRY	ORGANIC CHEMISTRY	6.1	5
376	0	2	125	By interpola	Fisher informati	2002		PHYSICS; SYSTEMS	JOURNAL OF PHYSICS A-	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	5
377	6	0	252	A pot expe	Effect of molybde	2002	Winter wheat; molybdenum; free		JOURNAL OF PLANT NUTRITION	AGRICULTURE	AGRICULTURAL CHEMISTRY	6.1	5
378	0	11	269	Various lev	A theoretic	2002		POLARIZABLE CONTINUUM	JOURNAL OF THE CHEMICAL SOCIETY-	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
379	0	9	153	TiN films w	Substrat e bias	2002		CHEMICAL-VAPOR-	JOURNAL OF VACUUM SCIENCE &	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
380	0	0	122	A new appi	Gear fault	2002			MECHANICAL SYSTEMS AND	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	MACHINERY & TOOLS	6.3	5

381	0	14	125	Pair potent	Atomistic study of	2002		PERMANENT-MAGNET	MODELLING AND SIMULATION IN	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
382	0	11	22	Reaction o	[NiL](3)[BTC](2)c	2002		METAL-ORGANIC FRAMEWORKS;	NEW JOURNAL OF CHEMISTRY	CHEMISTRY	POLYMER CHEMISTRY	6.1	4
383	5	3	262	Polymer fil	Chemical	2002	ion irradiation; polymer; chemical	OPTICAL-ABSORPTION;	NUCLEAR INSTRUMENTS &	NUCLEAR SCIENCE & TECHNOLOGY	NUCLEAR INSTRUMENTATION	6.1	4
384	18	5	143	A novel str	New structure	2002	bit synchronization;	WDM NETWORKS;	OPTICAL ENGINEERING	PHYSICS	FIBER OPTICS & INTEGRATED OPTICS	6.2	4
385	0	3	90	The phosp	Phosphorylation	2002		AQUEOUS-SOLUTION;	ORIGINS OF LIFE AND EVOLUTION OF	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
386	3	12	249	We have s	Magnetic-phase	2002	magnetic-phase transition;	ENTROPY CHANGE; RTIGE	PHYSICA B	PHYSICS	CRYSTALLOGRAPHY	6.1	5
387	0	3	83	We report	Measurement of	2002		MESON SYSTEM; VIOLATION	PHYSICAL REVIEW LETTERS	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
388	0	12	246	Tryptophar	Targeting	2002		CATHARANTHUS-ROSEUS;	PLANT PHYSIOLOGY	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
389	7	6	208	Heterogen	Morphologies of	2002	latex particles; morphology;	POLY(METHYL METHACRYLATE	POLYMER INTERNATIONAL	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
390	0	12	208	Green tea	Protective effects	2002		ACTIVATED PROTEIN-	REDOX REPORT	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.1	5
391	10	1	176	Ab initio UI	Ab initio study on	2002	isocyanic acid; radical reaction;	NITROGEN	SCIENCE IN CHINA SERIES B-	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
392	15	9	213	The well-al	Preparation of	2002	carbon nanotube; silicon nanowire;	CHEMICAL-VAPOR-	SCIENCE IN CHINA SERIES B-	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
393	5	4	132	Magnetohy	Magnetohydrodyn	2002	aluminum; inclusions;	MAGNETIC-FIELD;	SCIENCE IN CHINA SERIES E-	PHYSICS	PLASMA PHYSICS & MAGNETOHYDRODYNAMIC	6.1	5
394	8	4	239	Paleopedo	Paleopedological	2002	agricultural loess soils;	NORTH-ATLANTIC;	SOIL SCIENCE	AGRICULTURE	AGRICULTURAL ENGINEERING	6.2	4
395	0	21	177	The rationa	Single-crystal X-	2002		TRIVACANT HETEROPOLYTU	SYNTHESIS AND REACTIVITY IN	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
396	2	0	90	A novel pol	Identification of	2002	HLA; polymorphism		TISSUE ANTIGENS	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
397	7	5	157	Recent res	Symmetry	2002	symmetry; binary map; visual	MIRROR SYMMETRY;	VISION RESEARCH	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	5
398	8	6	86	The surfac	Surface property	2002	bolaform anphiphiles; mixed	CHROMATIC TRANSITION;	ACTA CHIMICA SINICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
399	6	1	104	Electrochr	Preparation of	2002	sol-gel method; rhodium oxide	WINDOWS	ACTA CHIMICA SINICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
400	9	3	149	Supramole	Synthesis, crystal	2002	supramolecular complex;	INTERMOLECULAR	ACTA CHIMICA SINICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4

401	4	2	171	A new BED	Synthesis,	2002	BEDT-TTF; synthesis;	ORGANIC SUPERCONDUC	ACTA CHIMICA SINICA	PHYSICS	SOLID STATE PHYSICS	6.1	5
402	8	0	83	The higher	Higher order	2002	asymptotic; V-notch; higher order		ACTA MECHANICA SOLIDA SINICA	PHYSICS	MECHANICS	6.1	5
403	11	4	75	The almost	The probabilit	2002	almost sure stability;	DYNAMIC STABILITY;	ACTA MECHANICA SOLIDA SINICA	PHYSICS	MECHANICS	6.1	4
404	6	1	37	Utlizing the	The Gaudin	2002	integrable model; correlation	XXZ	ACTA PHYSICA SINICA	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	4
405	14	1	97	The charac	Analysis of all-	2002	cascaded second-order nonlinearity;	PHASE-SHIFTS	ACTA PHYSICA SINICA	ELECTROTECHNOLOGY & FLUIDICS	ELECTROOPTICAL & OPTOELECTRONIC	6.1	5
406	7	0	102	By using th	The harmono	2002	lattice dynamics; harmonon; soft		ACTA PHYSICA SINICA	PHYSICS	CRYSTALLOGRAPHY	6.1	5
407	8	10	120	Kohlrausch	Thermal behaviou	2002	dielectric relaxation;	STRETCHED-EXPONENTIAL	ACTA PHYSICA SINICA	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
408	6	1	173	With the vi	Experim ental	2002	extrusion; island-sea melting model;	EXTRUDERS	ADVANCES IN POLYMER	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
409	7	11	172	A novel inte	Develop ment of	2002	sensor; adrenaline;	CHEMI-LUMINESCENCE;	ANALYTICA CHIMICA ACTA	NAVIGATION, DETECTION & COUNTERMEASURES	MISCELLANEOUS MATERIALS	6.2	4
410	7	0	27	The existe	Existenc e and	2002	initial value problems; periodic		APPLIED MATHEMATICS AND	MATHEMATICAL & COMPUTER SCIENCES	OPERATIONS RESEARCH	6.1	3
411	0	15	153	The growth	Transmi ssion	2002		CUPRATE 2212-TO-2223	APPLIED PHYSICS LETTERS	PHYSICS	CRYSTALLOGRAPHY	6.1	4
412	0	2	243	One of the	Suppres sion of	2002		MINE DRAINAGE	ARCHIVES OF ENVIRONMENTAL	ENVIRONMENTAL POLLUTION & CONTROL	SOLID WASTES POLLUTION CONTROL	6.1	5
413	8	4	285	Objective T	Reductio n in	2002	primary nocturnal enuresis;	CHILDREN; DESMOPRESSIN;	BJU INTERNATIONAL	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
414	0	7	70	The effect	Upper critical	2002		EIGENVALUE PROBLEMS;	CALCULUS OF VARIATIONS AND	PHYSICS	SOLID STATE PHYSICS	6.1	4
415	12	6	101	Pt/CoAl2O	A novel catalyst	2002	combination CO2 reforming and	TEMPERATURE-PROGRAMMED	CATALYSIS LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
416	8	0	90	The isother	Studies on the	2002	polythermal solubility diagram;		CHEMICAL JOURNAL OF CHINESE	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.1	5
417	5	5	103	The evalua	Compres sibility	2002	IR spectra; compression;	ULTRAVIOLET-VISIBLE	CHEMICAL JOURNAL OF CHINESE	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	5
418	5	0	54	The enanti	Enantios elective	2002	12-carboxyeudesma-		CHEMICAL JOURNAL OF CHINESE	CHEMISTRY	ORGANIC CHEMISTRY	6.1	4
419	6	0	158	Three kind	Liquid-phase	2002	palladium; polymer supported catalyst;		CHEMICAL JOURNAL OF CHINESE	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
420	4	3	69	Nearly tran	Studies on the	2002	hydrogel; microemulsion;	MICRO-EMULSION	CHEMICAL JOURNAL OF CHINESE	CHEMISTRY	POLYMER CHEMISTRY	6.1	5

421	0	6	62	We have e	Engineering a	2002		SITE-DIRECTED MUTAGENESIS;	CHEMISTRY LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
422	0	5	175	Multilayer u	Self-assembl	2002		BUILDING-BLOCKS;	CHEMISTRY OF MATERIALS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
423	7	1	44	Several iso	1,3-dipolar	2002	1;3-dipolar cycloaddition;	DERIVATIVES	CHINESE CHEMICAL LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
424	6	0	107	An aqueou	An acidic polysacc	2002	Tribulus terrestris L.;		CHINESE CHEMICAL LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
425	9	0	90	Diphenylca	Rapid in-situ	2002	portable photometer; Cr		CHINESE CHEMICAL LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
426	6	5	65	Self-orderi	Preparation of	2002	porous alumina film; anodization;	SELF-ORGANIZED	CHINESE CHEMICAL LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
427	9	0	93	According	Structure direction	2002	high aluminum zeolites; NaA;		CHINESE JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
428	7	4	148	Layered Do	Studies on	2002	MgFe-LDH; MgAl-LDH; structure	BASIC PROPERTIES;	CHINESE JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
429	9	6	165	The energy	Periodic DFT	2002	crystalline alkali metal azides; DFT;	ELASTIC PROPERTIES;	CHINESE SCIENCE BULLETIN	MATERIALS	METALLURGY & METALLOGRAPHY	6.2	4
430	10	6	169	With scann	Phase boundary	2002	Zn-Al alloy; superplasticity;	AL EUTECTOID ALLOY; STRESS;	CHINESE SCIENCE BULLETIN	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
431	11	9	63	A scheme	Probabilistic	2002	probabilistic teleportation; Bell	2-PARTICLE ENTANGLED	COMMUNICATIONS IN THEORETICAL	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	5
432	8	5	103	We have in	Detailed descripti	2002	interacting boson model; mixed	NUCLEI; ISOTOPES; PD;	COMMUNICATIONS IN THEORETICAL	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
433	7	12	130	This paper	Numerical	2002	radial basis functions; triphasic	PARTIAL-DIFFERENTIAL	COMPUTATIONAL MECHANICS	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	4
434	10	3	156	By using th	Entropy of	2002	quantum statistics; brick-wall method;	SCHWARZSCHILD; GEOMETRY;	CZECHOSLOVAK JOURNAL OF	ASTRONOMY & ASTROPHYSICS	ASTRONOMY	6.2	5
435	15	1	160	The underp	The study of	2002	antimony; underpotential	SB	ELECTROANALYSIS	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.2	4
436	0	1	49	Full-scale d	Dynamic characte	2002		SCALE	ENGINEERING STRUCTURES	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	STRUCTURAL ENGINEERING & BUILDING	6.2	5
437	8	13	211	Protein kin	Translocation of	2002	kinases; signal transduction;	MOUSE OOCYTES; CELL-	EXPERIMENTAL CELL RESEARCH	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
438	8	6	102	The tautom	Tautomeric	2002	near critical fluids; phase behavior;	SUPERCRITICAL CARBON-	FLUID PHASE EQUILIBRIA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
439	3	0	148	In this pape	Structure of the	2002	Pomeron; glueball; non-perturbative		HIGH ENERGY PHYSICS AND	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
440	8	0	90	It is importa	Energy calibratio	2002	dark matter; CsI(Tl) crystal;		HIGH ENERGY PHYSICS AND	NUCLEAR SCIENCE & TECHNOLOGY	NUCLEAR INSTRUMENTATION	6.1	5

441	8	14	167	Mature der	Dendrito mas	2002	hepatocellular carcinoma;	CANCER VACCINES;	IMMUNOLOGY LETTERS	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
442	10	9	119	We isolate	Molecula r cloning,	2002	casein kinase family; CK1	CASEIN KINASE-I;	INTERNATIONAL JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
443	5	1	50	Based on t	Analysis of	2002	thermal cycling; micro PCR chip	AMPLIFICATION	INTERNATIONAL JOURNAL OF	NAVIGATION, DETECTION & COUNTERMEASURES	MISCELLANEOUS MATERIALS	6.1	5
444	8	3	99	Micromach	Structura l failure	2002	micromachined accelerometer;	MICROMACHINE D INERTIAL	INTERNATIONAL JOURNAL OF	ELECTROTECHNOLOGY & FLUIDICS	ELECTRICAL & ELECTRONIC EQUIPMENT	6.1	5
445	14	0	67	A bulk micr	Numeric al	2002	microelectromech anical system		INTERNATIONAL JOURNAL OF	ELECTROTECHNOLOGY & FLUIDICS	ELECTRICAL & ELECTRONIC EQUIPMENT	6.2	5
446	0	0	206	Bolder-bun	Micro-machine	2002			INTERNATIONAL JOURNAL OF	CHEMISTRY	PHYSICAL CHEMISTRY	6.2	4
447	8	2	134	In this pape	Lubricati on theory	2002	thin film lubrication;	SURFACE; CONTACT	INTERNATIONAL JOURNAL OF	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
448	5	1	68	Micro or na	Nano-frictional	2002	nanofriction; silicon; roughness;	ROUGHNESS	INTERNATIONAL JOURNAL OF	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
449	5	0	111	A simplified	The pumping	2002	pumping effect; phase transition;		INTERNATIONAL JOURNAL OF	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	PUMPS, FILTERS, PIPES, TUBING, FITTINGS &	6.1	5
450	5	1	90	In this pape	Characte rization	2002	transient measurements;	GAAS	INTERNATIONAL JOURNAL OF	PHYSICS	SOLID STATE PHYSICS	6.1	4
451	7	0	156	In this pape	Electrical propertie	2002	poly-Si1-xGex; resistivity; Hall		INTERNATIONAL JOURNAL OF	PHYSICS	SOLID STATE PHYSICS	6.1	5
452	6	0	25	The relatio	The inner	2002	inner pressure; TFD theory;		INTERNATIONAL JOURNAL OF	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
453	15	2	152	The state v	The state	2002	multilayered piezoelectric	GREEN-FUNCTIONS;	INTERNATIONAL JOURNAL OF SOLIDS	PHYSICS	SOLID STATE PHYSICS	6.2	4
454	10	1	96	This paper	H infinity PID	2002	H-infinity control; optimal control;	SYSTEMS	ISA TRANSACTIONS	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	5
455	0	0	93	A SiGe/Si r	SiGe/Si resonant-	2002			JOURNAL OF APPLIED PHYSICS	PHYSICS	SOLID STATE PHYSICS	6.1	5
456	14	7	223	Purpose: A	Compari ng whole	2002	F-18-2-deoxyglucose;	GLUCOSE ANALOG; PET;	JOURNAL OF CANCER RESEARCH	BIOLOGICAL & MEDICAL SCIENCES	RADIOBIOLOGY	6.2	5
457	12	14	147	The motion	Numeric al	2002	fixed bottom; 2D surface wave;	RAYLEIGH-TAYLOR	JOURNAL OF COMPUTATIONAL	EARTH SCIENCES & OCEANOGRAPHY	PHYSICAL & DYNAMIC OCEANOGRAPHY	6.1	5
458	13	5	98	Single crys	Growth and	2002	optical microscopy;	LASER; SPECTROSCOPY	JOURNAL OF CRYSTAL GROWTH	PHYSICS	CRYSTALLOGRAPHY	6.1	5
459	7	6	109	By pre-hyd	Retardin g effect	2002	titanium dioxide; transformation;	SOL-GEL METHOD; PHASE-	JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
460	11	0	113	MgO-Al2O:	Elastic moduli of	2002	MgO-Al2O3-SiO2-TiO2-Y2O3 glass;		JOURNAL OF INORGANIC	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5

461	5	4	106	Well-crysta	Preparati on,	2002	CuCl14PC; zeolite; nanocrystalline;	IRON-PHTHALOCYANI	JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
462	5	1	60	Hydroxyap	Experim ental	2002	hydrothermal synthesis;	CALCIUM-PHOSPHATE	JOURNAL OF INORGANIC	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
463	5	0	66	The tempe	Evidence for	2002	resistivity; heat conductivity;		JOURNAL OF MAGNETISM AND	PHYSICS	SOLID STATE PHYSICS	6.1	4
464	12	4	133	In this pape	The coordinat	2002	nylon; near-field scanning optical	ABSORPTION FINE-	JOURNAL OF MOLECULAR	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
465	4	8	64	We presen	The entangle	2002	purification; POVM; entangled	PODOLSKY-ROSEN	JOURNAL OF OPTICS B-QUANTUM AND	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
466	0	14	62	In this pape	Infinitely many	2002		RELATIVISTIC VOLTERRA	JOURNAL OF PHYSICS A-	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	4
467	5	2	131	We propos	Fukui-Ishibashi	2002	traffic flow; cellular automaton models	CELLULAR-AUTOMATON	JOURNAL OF THE PHYSICAL SOCIETY	NAVIGATION, DETECTION & COUNTERMEASURES	NAVIGATION & GUIDANCE	6.2	4
468	5	0	83	According t	Improve ment of	2002	steelmaking; EAF; high impedance;		JOURNAL OF UNIVERSITY OF	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
469	11	0	108	Employing	Applicati on of	2002	plate mill; work roll; wear;		JOURNAL OF UNIVERSITY OF	MATERIALS	METALLURGY & METALLOGRAPHY	6.3	4
470	9	8	81	Electrical p	Frequen cy	2002	complex impedance;	BATIO3 CERAMICS;	MATERIALS CHEMISTRY AND	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
471	0	0	70	This article	Failure avoidanc	2002			MATERIALS PERFORMANCE	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	SURFACE TRANSPORTATION &	6.2	5
472	7	13	333	This paper	Deforma tion	2002	TiAl alloy; intermetallics;	DEFORMED TI-45AL-10NB	MATERIALS SCIENCE AND ENGINEERING A-	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
473	12	5	154	Microstruct	An electron	2002	iron aluminides; superplastic	CHANNELING CONTRAST;	MATERIALS SCIENCE AND ENGINEERING A-	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
474	6	0	64	Thin film of	XPS study on	2002	merocyanine; vacuum		MOLECULAR CRYSTALS AND	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
475	8	15	82	We apply t	Multi-strange	2002	hypernuclei; multi-strange objects;	MESON COUPLING	NUCLEAR PHYSICS A	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5
476	0	7	278	The effects	Maternal ,	2002		HONG-KONG; HEALTH;	PAEDIATRIC AND PERINATAL	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
477	0	10	148	We propos	Quantum computat	2002		PAUL TRAP; LOGIC; STATE;	PHYSICAL REVIEW A	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	4
478	0	14	79	The morph	Crosshat ching on	2002		ANOMALOUS STRAIN	PHYSICAL REVIEW B	PHYSICS	SOLID STATE PHYSICS	6.1	5
479	0	13	76	Based on a	Electroni c	2002		T-C SUPERCONDUC	PHYSICAL REVIEW B	PHYSICS	SOLID STATE PHYSICS	6.1	5
480	0	6	80	We show t	Extende d self-	2002		FULLY-DEVELOPED	PHYSICAL REVIEW E	PHYSICS	FLUID MECHANICS	6.1	5

481	0	1	63	The theore	The theoretic	2002		EEG	PHYSICS IN MEDICINE AND	MATHEMATICAL & COMPUTER SCIENCES	THEORETICAL MATHEMATICS	6.1	4
482	0	6	68	In the fram	q- deforme	2002		Q-COHERENT STATES;	PHYSICS LETTERS B	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	5
483	10	11	161	Reactions (	Synthese s and	2002	mononuclear complexes;	X-RAY STRUCTURE; C-	POLYHEDRON	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
484	5	0	37	This paper	Singulari ty	2002	singular Jacobi form; cusp form		SCIENCE IN CHINA SERIES A-	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	5
485	4	3	50	A high-stab	Measure ments of	2002	optical tweezers; displacement;	SPHERICAL- ABERRATION;	SCIENCE IN CHINA SERIES A-	PHYSICS	OPTICS	6.1	5
486	19	9	139	Application	Genetic mapping	2002	semi-dwarf gene sd-t(t); simple	ASYMMETRIC INTERLACED	SCIENCE IN CHINA SERIES C-LIFE	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
487	7	0	100	On the bas	Function al	2002	coordination polyhedron;		SCIENCE IN CHINA SERIES D-EARTH	PHYSICS	CRYSTALLOGRAPHY	6.1	5
488	6	0	131	To measur	Polarime tric	2002	chirality; non- spherical particle;		SCIENCE IN CHINA SERIES F	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
489	9	12	168	In this stud	Electrical and gas-	2002	mesostructured tin oxide; surface	MESOPOROUS MOLECULAR-	SENSORS AND ACTUATORS B-	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
490	7	7	193	The chrom	Determin ation of	2002	beta-cyclodextrin polymer; polymer	ATOMIC- ABSORPTION	SUPRAMOLECULAR CHEMISTRY	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
491	10	13	159	The micros	Microsco pic	2002	titanium alloy; laser cladding;	NI-AL BRONZE; WEAR-	SURFACE & COATINGS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
492	8	13	32	Transforma	Formatio n of 1,2-	2002	samarium diiodide; reductive coupling;	ABSOLUTE RATE CONSTANTS;	TETRAHEDRON LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
493	6	8	108	BN films w	cBN Films	2002	cBN films; ECR; CVD; hot filament	CUBIC BORON- NITRIDE; BN	VACUUM	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
494	0	0	35	BGaH3KO	Crystal structure	2002			ZEITSCHRIFT FUR KRISTALLOGRAPHIE-	PHYSICS	CYRSTALLOGRAPHY	6.1	5
495	9	11	217	Rationale a	Compute r-aided	2002	breast neoplasms; diagnosis; breast	TEXTURE ANALYSIS;	ACADEMIC RADIOLOGY	BIOLOGICAL & MEDICAL SCIENCES	RADIOBIOLOGY	6.3	5
496	6	5	127	With the de	Ultrastru cture of	2002	Hypericum perforatum;	ANTIRETROVIRA L ACTIVITY;	ACTA BOTANICA SINICA	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
497	7	11	166	Seedling ch	Molecula r	2002	QTL mapping; seedling	MARKER- ASSISTED	ACTA BOTANICA SINICA	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.2	5
498	6	2	260	Relations b	Relation s	2002	conformation; strength; elastic	FIBROIN; FIBERS	ACTA POLYMERICA SINICA	MATERIALS	MISCELLANEOUS MATERIALS	6.1	5
499	7	0	352	Isocyanura	Characte rization	2002	hexamethylenediis ocyanate(HDI);		ACTA POLYMERICA SINICA	CHEMISTRY	ORGANIC CHEMISTRY	6.1	4
500	6	2	197	Fullerols w	Self- assembl	2002	fullerols; polycation; self-	C-60; POLYMERS	ACTA POLYMERICA SINICA	CHEMISTRY	POLYMER CHEMISTRY	6.1	5

501	7	5	108	Motivated l	Training multilaye	2002	multilayer perceptrons;	BACKPROPAGAT ION ALGORITHM;	ADVANCES IN COMPUTATIONAL	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	5
502	0	8	161	It has recei	The interactio	2002		NUCLEIC-ACIDS; INDUCED	ANALYTICAL SCIENCES	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
503	7	1	175	This paper	Asympto tic	2002	viscous conservation laws;	STABILITY	APPLIED MATHEMATICS	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	5
504	0	2	209	Objective. :	Discrimin atory	2002		MEDIAN NERVE	ARTHRITIS AND RHEUMATISM	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.3	5
505	4	0	110	Collaborati	Collabor ative	2002	hypermedia; collaborative		AUTOMATION IN CONSTRUCTION	MATHEMATICAL & COMPUTER SCIENCES	OPERATIONS RESEARCH	6.2	4
506	5	3	156	A novel tyr	Highly sensitive	2002	tyrosinase; chitosan;	ELECTRODES; PHENOLS; PH	BIOELECTROCHEMIS TRY	BIOTECHNOLOGY	BIOMEDICAL INSTRUMENTATION &	6.3	5
507	9	2	56	An ampero	An ampero	2002	amperometric biosensor;	ELECTRODES; SENSOR	BIOTECHNOLOGY LETTERS	BIOTECHNOLOGY	BIOMEDICAL INSTRUMENTATION &	6.3	5
508	8	0	100	It is one of	Study on high-	2002	GBFS; fly ash; blended cement;		CEMENT AND CONCRETE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.2	5
509	0	15	169	The gas ph	Theoreti cal and	2002		MOLECULAR-BEAM METHOD;	CHEMICAL PHYSICS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
510	12	11	222	Extraction (	Equilibriu m of	2002	succinic acid; malic acid; maleic	TRI-N-OCTYLAMINE;	CHINESE JOURNAL OF CHEMICAL	CHEMISTRY	ORGANIC CHEMISTRY	6.1	4
511	8	0	124	The firing t	Study on fluorine	2002	fluorine expulsion; fluorine retention;		CHINESE JOURNAL OF CHEMICAL	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.2	5
512	6	1	119	The self-dif	Studies on the	2002	chitosan membrane;	NUCLEAR-MAGNETIC-	CHINESE JOURNAL OF POLYMER	CHEMISTRY	POLYMER CHEMISTRY	6.1	4
513	7	13	196	Objective T	Epstein-Barr	2002	Epstein-Barr virus; nasopharyngeal	CELLULAR SENESCENCE;	CHINESE MEDICAL JOURNAL	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
514	8	0	247	Objective T	Contrace ptive use	2002	contraceptive behavior;		CHINESE MEDICAL JOURNAL	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.3	5
515	4	5	225	Objective T	Relation ship	2002	elderly; Chinese; obesity; gender	INSULIN-RESISTANCE;	CHINESE MEDICAL JOURNAL	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
516	6	12	133	Bentonite s	A microstr	2002	bentonite; montmorillonite;	NUCLEAR-MAGNETIC-	CLAY MINERALS	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.1	5
517	10	1	183	This paper	Develop ment of	2002	DSP-based system;	TIME	COMPUTER METHODS AND	BIOLOGICAL & MEDICAL SCIENCES	MEDICAL FACILITIES, EQUIPMENT & SUPPLIES	6.3	4
518	13	12	328	Nonlinearit	Tempera ture	2002	temperature sensitivity of soil	CYCLE FEEDBACKS;	ECOLOGICAL MODELLING	BIOLOGICAL & MEDICAL SCIENCES	ECOLOGY	6.1	4
519	7	4	67	Cyclic volta	Electroc hemical	2002	metallofullerene; electrochemical	FULLERENES; C-60; FULLERIDES;	ELECTROCHEMISTR Y COMMUNICATIONS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
520	7	6	199	The objecti	Determin ation of	2002	grepafloxacin; ciprofloxacin;	WATER PARTITION-	EUROPEAN JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.1	4

521	5	2	106	Wound hea	Synthetic TGF-	2002	hypertrophic scarring; tissue	MODEL; MICE	FASEB JOURNAL	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.3	5
522	9	14	44	Various as	Successi on:	2002	colonisation; confocal	SUBUNIT RIBOSOMAL-	FUNGAL DIVERSITY	BIOLOGICAL & MEDICAL SCIENCES	MICROBIOLOGY	6.1	3
523	8	1	97	This note s	A note on the	2002	Markov chains; perturbation	POTENTIALS	IEEE TRANSACTIONS ON AUTOMATIC	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	4
524	10	4	188	Diagnosab	Diagnos ability of	2002	diagnosability; comparison	TOPOLOGICAL PROPERTIES;	IEEE TRANSACTIONS ON PARALLEL AND	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	4
525	5	7	71	Corundum	Preparati on of	2002	In2O3; ITO; corundum	INDIUM-TIN-OXIDE; SOL-GEL	INORGANIC CHEMISTRY	CHEMISTRY	INORGANIC CHEMISTRY	6.1	4
526	5	19	99	Dramatic a	Complex networks	2002	complex network; topology;	SMALL-WORLD NETWORKS;	INTERNATIONAL JOURNAL OF	MATHEMATICAL & COMPUTER SCIENCES	COMPUTER SYSTEMS	6.1	4
527	5	7	110	We investi	On the mathem	2002	snap-back-repeller; chaos;	DIFFERENCE-EQUATIONS;	INTERNATIONAL JOURNAL OF	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	5
528	10	18	259	To uncove	Anticanc er effect	2002	retinoid receptor; activator protein-1;	ACTIVATOR PROTEIN-1	INTERNATIONAL JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
529	13	4	294	The stabilit	Estimatin g the	2002	excavation disturbed zone;	DISPLACEMENT BACK ANALYSIS;	INTERNATIONAL JOURNAL OF ROCK	EARTH SCIENCES & OCEANOGRAPHY	MINING ENGINEERING	6.3	5
530	9	7	140	The mecha	Structure-property	2002	linear low-density polyethylene;	ETHYLENE-PROPYLENE	JOURNAL OF APPLIED POLYMER	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
531	9	8	64	Applying qu	Qualitati ve	2002	enzyme reaction system; global	REACTION-DIFFUSION	JOURNAL OF BIOLOGICAL	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	4
532	13	2	194	The volatile	Volatile compoun	2002	anal gland secretion; volatile	SECRETION; ERMINEA	JOURNAL OF CHEMICAL ECOLOGY	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
533	12	2	200	The flowing	Study on laminar	2002	latex particles; laminar shear flow;	DILUTE POLYMER-	JOURNAL OF COLLOID AND	CHEMISTRY	POLYMER CHEMISTRY	6.1	4
534	12	7	70	La2CuO4 a	Crystal growth of	2002	floating zone technique; growth	HIGH-TC SUPERCONDUC	JOURNAL OF CRYSTAL GROWTH	PHYSICS	CRYSTALLOGRAPHY	6.1	5
535	0	17	232	Autoantibo	Large scale	2002		HUMAN COLON-CANCER; MAGE	JOURNAL OF IMMUNOLOGY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	5
536	0	3	91	This paper	The exponent	2002		SYSTEM; CHAOS; LIGHT	JOURNAL OF MATHEMATICAL	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	4
537	9	17	183	Macrophag	Induction of	2002	glioma; apoptosis; macrophage;	ANTIBODY-MEDIATED	JOURNAL OF NEURO-ONCOLOGY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	5
538	0	12	112	In this pape	Integrate d	2002		FERROELECTRI C DOMAIN-	JOURNAL OF PHYSICS D-APPLIED	ELECTROTECHNOLOGY & FLUIDICS	LINE, SURFACE & BULK ACOUSTIC WAVE DEVICES	6.1	4
539	8	13	122	A new two-	Synthesi s and	2002	hydrothermal synthesis; zinc	ZINC PHOSPHATE;	JOURNAL OF SOLID STATE CHEMISTRY	CHEMISTRY	INORGANIC CHEMISTRY	6.1	5
540	0	6	148	A novel fer	Synthesi s, crystal	2002		INTERMOLECUL AR	JOURNAL OF THE CHEMICAL SOCIETY-	CHEMISTRY	INORGANIC CHEMISTRY	6.1	4

541	0	9	103	A photon b	Quantum effects of	2002		MINIMUM-UNCERTAINTY	JOURNAL OF THE OPTICAL SOCIETY	PHYSICS	OPTICS	6.1	4
542	0	21	233	Noncovalent	Block-copolym	2002		CONNECTED POLYMERIC	MACROMOLECULES	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
543	5	12	66	The electro	Study of electroch	2002	electrochemical properties;	FULLERENE DERIVATIVES;	MICROCHEMICAL JOURNAL	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
544	0	8	105	A simple or	One-step synthesi	2002		SELF-ORGANIZATION;	NANO LETTERS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
545	7	7	171	The influen	Influence of	2002	rutile; neutron irradiation; optical	SINGLE-CRYSTAL; TIO2	NUCLEAR INSTRUMENTS &	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
546	0	9	55	DAMA exp	Results with the	2002		ANNUAL MODULATION	NUCLEAR PHYSICS B-PROCEEDINGS	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.2	3
547	0	8	74	In contrast	Can bridged	2002		1;6-METHANO<10>A	ORGANIC LETTERS	CHEMISTRY	ORGANIC CHEMISTRY	6.1	4
548	10	0	105	The boron	A study on	2002	ZSM-5 catalyst; alkylation reaction;		PETROLEUM SCIENCE AND	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
549	0	9	65	The fatigue	Fatigue problems	2002		DIRECT-CURRENT BIAS;	PHYSICA STATUS SOLIDI A-APPLIED	PHYSICS	ELECTRICITY & MAGNETISM	6.1	4
550	0	17	199	The two loc	Dynamical	2002		EFFECTIVE-FIELD THEORY;	PHYSICAL REVIEW D	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
551	0	9	35	The randor	Fourth order	2002		VACUUM WAVE-FUNCTION;	PHYSICAL REVIEW D	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.1	4
552	5	14	133	Magnetic p	Researc h on the	2002	nanocomposite materials;	ND-FE-B; PERMANENT-	PHYSICS LETTERS A	PHYSICS	CRYSTALLOGRAPHY	6.1	5
553	9	3	143	The crystal	Crystal structure	2002	mixed-valence compound;	PHASE-TRANSITIONS;	POLYHEDRON	PHYSICS	CRYSTALLOGRAPHY	6.1	5
554	6	0	39	We conside	On stable	2002	quasi-harmonic map; stableness;		PROCEEDINGS OF THE AMERICAN	MATHEMATICAL & COMPUTER SCIENCES	THEORETICAL MATHEMATICS	6.1	4
555	0	14	98	Bphs contr	Identifica tion of	2002		EXPERIMENTAL ALLERGIC	SCIENCE	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	4
556	7	3	144	The magne	The effect of	2002	magnetically ordered materials;	LA0.5CA0.5MNO3; PEROVSKITES;	SOLID STATE COMMUNICATIONS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
557	11	3	131	The surfac	Surface structure	2002	lanthanides; silicides; surface	GROWTH; (100)SILICON;	SURFACE SCIENCE	PHYSICS	CRYSTALLOGRAPHY	6.1	4
558	0	22	105	A now met	A new method	2002		CYCLIC BORATE ESTER; HOST-	TETRAHEDRON LETTERS	PHYSICS	CRYSTALLOGRAPHY	6.1	4
559	9	0	99	Reduction	Kinetics of	2002	reduction kinetics; magnesia and		THERMOCHIMICA ACTA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
560	0	3	90	The title co	Tetraaqu a(1,10-	2002		CRYSTAL; MANGANESE;	ACTA CRYSTALLOGRAPHIC	PHYSICS	CRYSTALLOGRAPHY	6.1	5

561	0	0	39	In the title c	2-Cyano-N-	2002			ACTA CRYSTALLOGRAPHIC	CHEMISTRY	ORGANIC CHEMISTRY	6.1	4
562	9	4	135	Microstruct	Microstructure	2002	deformation enhanced	INDUCED FERRITE;	ACTA METALLURGICA	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
563	7	1	258	AIM: To stu	Effects of	2002	puerarin; galactose;	HUPERZINE-A	ACTA PHARMACOLOGICA	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.1	4
564	8	4	160	AIM: To de	GM-CSF and IFN-	2002	basophils; HLA antigen;	MEMBRANE STRUCTURES;	ACTA PHARMACOLOGICA	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
565	0	11	102	Inclusions (	Ultrahigh-pressure	2002		ZERMATT-SAAS ZONE;	AMERICAN MINERALOGIST	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.1	5
566	0	4	49	Focus retro	Focus retrocolli	2002		TALBOT INTERFEROMET	APPLIED OPTICS	PHYSICS	OPTICS	6.1	5
567	6	7	152	Objective: `	Does wearing	2002	braces; fatigue; knee; ligaments;	PROPRIOCEPTION;	ARCHIVES OF PHYSICAL MEDICINE	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.3	5
568	0	6	191	Aims: To s	Ophthalmopathy	2002		INCREASED INTRAOCULAR-	BRITISH JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
569	12	10	203	To investig	Overexpression of	2002	heme oxygenase; retroviral vector;	CARBON-MONOXIDE;	CELL RESEARCH	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
570	0	7	37	Co3O4 nar	Fabrication of	2002		POTASSIUM-SULFATE FLUX;	CHEMICAL COMMUNICATIONS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
571	0	0	128	The recent	Hybrid density-	2002			CHEMICAL PHYSICS LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
572	9	3	94	The chiral s	Enantiomer	2002	microchip-based electrophoresis;	CAPILLARY-ELECTROPHORE	CHINESE JOURNAL OF ANALYTICAL	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
573	9	9	125	In pH 2.76	Flow injection-	2002	flow injection analysis;	ION CHROMATOGRA	CHINESE JOURNAL OF ANALYTICAL	ENVIRONMENTAL POLLUTION & CONTROL	WATER POLLUTION & CONTROL	6.1	4
574	7	1	92	An extracti	Extraction-kinetic	2002	extraction; kinetic spectrophotometry	TRACE	CHINESE JOURNAL OF ANALYTICAL	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
575	23	13	200	1. Various	Smooth muscle	2002	antispastic management;	INTERNAL-MAMMARY-	CLINICAL AND EXPERIMENTAL	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
576	7	2	196	Studies on	Biological effects	2002	mechanical vibration; Actinidia	CELL-GROWTH; STRESS	COLLOIDS AND SURFACES B-	BIOLOGICAL & MEDICAL SCIENCES	STRESS PHYSIOLOGY	6.1	5
577	10	2	229	In-situ gam	In-situ gamma-	2002	gamma-ray spectrometry;	ENGINEERING PROPERTIES	EARTH SURFACE PROCESSES AND	EARTH SCIENCES & OCEANOGRAPHY	GEOLOGY, GEOCHEMISTRY &	6.1	5
578	4	0	83	In order to	Clean and	2002	coal; plasma; pyrolysis;		ENERGY SOURCES	PROPULSION, ENGINES & FUELS	FUELS	6.2	5
579	8	12	241	Objective:	Laser-assisted	2002	assisted hatching; embryo; laser;	1.48-MU-M DIODE-LASER;	FERTILITY AND STERILITY	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.2	4
580	9	15	271	Oligoastroc	Clonality of	2002	oligoastrocytoma; clonality; loss of	COMPARATIVE GENOMIC	HUMAN PATHOLOGY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	5

581	0	17	258	Antigen-sp	Circulati ng	2002		MUCOSAL IMMUNOLOGICA	IMMUNOLOGY	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
582	8	2	177	A feature-b	Mechani cal	2002	disassembly; geometric	GENERATION; SYSTEM	INTERNATIONAL JOURNAL OF	MATHEMATICAL & COMPUTER SCIENCES	OPERATIONS RESEARCH	6.1	3
583	8	15	79	In this pape	Dynamic s of	2002	interaction of spike solutions; Gierer-	SINGULAR PERTURBATION	JAPAN JOURNAL OF INDUSTRIAL AND	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.1	4
584	0	3	127	Nanocomp	Exchang e-	2002		HIGH-REMANENCE;	JOURNAL OF APPLIED PHYSICS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
585	11	2	86	The phase	Determin ation of	2002	Ni-Re-Hf ternary system; diffusion	NICKEL; PHASE	JOURNAL OF CENTRAL SOUTH	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
586	7	1	95	Understand	Researc h on	2002	coupling; multi-agent;	AGENTS	JOURNAL OF CENTRAL SOUTH	BEHAVIORAL & SOCIAL SCIENCES	LINGUISTICS	6.1	4
587	7	9	31	The treatm	Synthesi s of	2002	allylic esters; allylic ethers; polymer-	SOLID-PHASE SYNTHESIS;	JOURNAL OF CHEMICAL	CHEMISTRY	POLYMER CHEMISTRY	6.1	4
588	0	14	179	We describ	Catheter-related	2002		CORYNEBACTER IUM-	JOURNAL OF CLINICAL	BIOLOGICAL & MEDICAL SCIENCES	MICROBIOLOGY	6.1	5
589	7	9	155	The micros	Characte rization	2002	HREM; CMR materials; defect;	PULSED-LASER DEPOSITION;	JOURNAL OF ELECTRON	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
590	14	2	101	The flow fie	Numeric al	2002	small blunt reentry bodies; high	BOUNDARY-LAYER	JOURNAL OF INFRARED AND	PHYSICS	OPTICS	6.1	4
591	10	0	71	According	Up-conversi	2002	electron trapping materials; CaS :		JOURNAL OF INFRARED AND	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
592	0	10	75	Highly orde	Highly ordered	2002		ALUMINUM-OXIDE	JOURNAL OF MATERIALS	PHYSICS	CRYSTALLOGRAPHY	6.1	5
593	8	12	231	Controvers	Prevalen ce and	2002	human papillomavirus;	GENITAL HUMAN-PAPILLOMAVIRU	JOURNAL OF MEDICAL VIROLOGY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	5
594	7	17	120	Ni-B alloy i	Adsorpti on of	2002	Ni-B alloy; density functional theory;	EFFECTIVE CORE	JOURNAL OF MOLECULAR	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
595	0	7	95	Laser ablat	Matrix isolation	2002		SOLID ARGON; SPECTRA;	JOURNAL OF PHYSICAL	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
596	9	0	178	The effect	Compari son of	2002	pitting; general corrosion; passive		JOURNAL OF THE SERBIAN CHEMICAL	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
597	8	14	230	Backgroun	Activatio n of	2002	cell cycle; cyclin; cyclin-dependent	CELL-NUCLEAR ANTIGEN; P53	LIVER	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	5
598	15	14	296	The disloca	Dislocati on	2002	Cu single crystal; dislocation	CYCLIC DEFORMATION-	MATERIALS SCIENCE AND ENGINEERING A-	PHYSICS	CRYSTALLOGRAPHY	6.1	5
599	13	7	102	Let (Sigma	The pressure	2002	pressure; product of matrices; Gibbs	ITERATED FUNCTION	MATHEMATICAL RESEARCH LETTERS	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	5
600	11	10	106	Periodic m	Synthesi s of	2002	organic-inorganic hybrid material;	ORGANIC GROUPS;	MICROPOROUS AND MESOPOROUS	CHEMISTRY	ORGANIC CHEMISTRY	6.1	5

601	0	12	217	GnRH has	Characterization	2002		GONADOTROPIN-RELEASING-	MOLECULAR ENDOCRINOLOGY	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	5
602	0	6	97	Field mode	Combustion and	2002		DIFFUSION FLAMES;	NUMERICAL HEAT TRANSFER PART A-	CHEMISTRY	PHYSICAL CHEMISTRY	6.2	5
603	8	0	81	CW single-	Coupled-cavity,	2002	self-frequency-doubling; single-		OPTICS COMMUNICATIONS	ELECTROTECHNOLOGY & FLUIDICS	LASERS & MASERS	6.1	4
604	6	4	120	Photosynth	Photosynthetic	2002	C-3 and C-4 species; grazing	GEOGRAPHICAL-DISTRIBUTION;	PHOTOSYNTHETICA	BIOLOGICAL & MEDICAL SCIENCES	STRESS PHYSIOLOGY	6.1	4
605	0	17	131	A system o	Density matrix	2002		CONTINUOUS VARIABLE	PHYSICAL REVIEW E	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	3
606	0	8	119	The investi	Directed random	2002		SELF-AVOIDING WALKS;	PHYSICAL REVIEW E	MATHEMATICAL & COMPUTER SCIENCES	OPERATIONS RESEARCH	6.2	3
607	6	2	81	We propos	A fast chaotic	2002	chaos; cryptography;	ENCRYPTION; SYSTEMS	PHYSICS LETTERS A	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.2	4
608	8	4	145	The classic	Atomic stick-slip	2002	molecular dynamics	MOLECULAR-DYNAMICS	PROGRESS IN NATURAL SCIENCE	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
609	7	1	79	A mutant s	Identification and	2002	green fluorescent protein; gfpK79R	GENE-EXPRESSION	PROGRESS IN NATURAL SCIENCE	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	4
610	9	0	122	Base on th	Liquid metal	2002	permanent magnet; magnetic		RARE METAL MATERIALS AND	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
611	6	4	83	CeO2 nanc	Preparation of	2002	Cc; CeO2; hydrosol; colloidal	NANOCRYSTALLINE; CERIUM(IV);	RARE METAL MATERIALS AND	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
612	14	1	170	This paper	A differenti	2002	differential capacitance	SENSOR	SENSORS AND ACTUATORS A-	ELECTROTECHNOLOGY & FLUIDICS	ELECTRICAL & ELECTRONIC EQUIPMENT	6.2	4
613	7	1	88	In this pape	Wavelengths and	2002	zinc isoelectronic sequence;	LI	SPECTROSCOPY AND SPECTRAL	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	5
614	5	0	88	FTIR and F	FTIR and FT-	2002	lanthanum; galactitol; FTIR;		SPECTROSCOPY AND SPECTRAL	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
615	9	0	70	Fluorescen	Cetyltrimethylam	2002	fluorescence enhancement;		SPECTROSCOPY AND SPECTRAL	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
616	5	0	90	The metho	Determination of	2002	ICP-AES; tranexamic acid;		SPECTROSCOPY AND SPECTRAL	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
617	6	0	63	An atmoic	Determination of	2002	arsenic; atomic fluorescence		SPECTROSCOPY AND SPECTRAL	BIOLOGICAL & MEDICAL SCIENCES	TOXICOLOGY	6.1	4
618	0	18	134	We report t	Crystal structure	2002		HUMAN-IMMUNODEFICIE	STRUCTURE	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	5
619	0	3	36	The reactic	Synthesis of	2002		STEREOCHEMICALLY	TETRAHEDRON-ASYMMETRY	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
620	0	5	198	The reactic	The mechani	2002		PHOTODEGRADATION;	WATER RESEARCH	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4

621	8	6	133	The structu	The structure	2002	bismuth-vanadium-molybdenum	PROPYLENE OXIDATION;	ACTA CHIMICA SINICA	PROPULSION, ENGINES & FUELS	FUELS	6.1	5
622	5	0	138	Rare earth	Studies on	2002	bacteriostatic mechanism; rare		ACTA CHIMICA SINICA	BIOLOGICAL & MEDICAL SCIENCES	MICROBIOLOGY	6.1	5
623	8	2	83	Different Si	Improve d	2002	SAPO-11; SAPO region; Si region;	MOLECULAR-SIEVES;	ACTA CHIMICA SINICA	PHYSICS	CRYSTALLOGRAPHY	6.1	4
624	8	0	83	In this pape	Elastic impact	2002	impact; wave propagation;		ACTA MECHANICA SINICA	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
625	10	1	94	Photoinduc	The fluoresce	2002	sodium dodecyl sulfate;	ASSEMBLIES	ACTA PHYSICO-CHIMICA SINICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
626	15	3	152	The effectiv	Synthesi s and	2002	hexamethylenbisa mide (HMBA); 3;3	ANTICANCER AGENTS;	ACTA PHYSICO-CHIMICA SINICA	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	4
627	7	0	135	A single sp	New occurren	2002	arthropods; Sidneyia;		ALCHERINGA	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
628	0	7	181	Nanometer	Applicati on of	2002		QUANTUM DOTS; DNA;	ANALYST	NAVIGATION, DETECTION & COUNTERMEASURES	MISCELLANEOUS MATERIALS	6.1	4
629	14	11	213	A new met	Monitorin g and	2002	monitoring; binding process;	ACOUSTIC-WAVE SENSOR;	ANALYTICAL BIOCHEMISTRY	ELECTROTECHNOLOGY & FLUIDICS	LINE, SURFACE & BULK ACOUSTIC WAVE DEVICES	6.1	5
630	0	9	125	An organic	Organic-film	2002		EFFICIENT; DEVICES;	APPLIED PHYSICS LETTERS	ELECTROTECHNOLOGY & FLUIDICS	ELECTROOPTICAL & OPTOELECTRONIC	6.1	5
631	7	12	150	Effects of p	Enhance ment of	2002	lysosome; membrane thiol	ERYTHROCYTE-MEMBRANE;	ARCHIVES OF BIOCHEMISTRY AND	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.1	4
632	8	10	324	Chinese all	Genetic variation	2002	Alligator sinensis; RAPD; genetic	BIOLOGICAL CONSERVATION;	BIOLOGICAL CONSERVATION	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
633	7	2	238	Due to the	Influence of	2002	condensers; heat rejection;	CFD; FLOWS	BUILDING AND ENVIRONMENT	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	AIR CONDITIONING, LIGHTING, HEATING, &	6.2	5
634	5	4	163	W-doped M	Novel heteroge	2002	cyclopentene; glutaraldehyde;	MESOPOROUS MOLECULAR-	CATALYSIS LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
635	0	18	208	Employing	Quantum dynamic	2002		DISCRETE VARIABLE	CHEMICAL PHYSICS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
636	3	3	50	This gently	A cylindrica	2002	fluorescence; polymers; self-	LIQUID-CRYSTALS;	CHEMPHYSCHEM	CHEMISTRY	POLYMER CHEMISTRY	6.1	5
637	6	0	142	Subsea pip	Trial and numerica	2002	seabed pipeline; large deflection;		CHINA OCEAN ENGINEERING	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	PUMPS, FILTERS, PIPES, TUBING, FITTINGS &	6.1	5
638	10	13	119	The line pr	Line broadeni	2002	sun : flares; sun : atmospheric	26 JUNE 1992; IMPULSIVE	CHINESE JOURNAL OF ASTRONOMY AND	ASTRONOMY & ASTROPHYSICS	ASTRONOMY	6.1	5
639	0	0	53	The origin	A possible	2002			CHINESE PHYSICS LETTERS	BEHAVIORAL & SOCIAL SCIENCES	ECONOMICS & COST ANALYSIS	6.2	5
640	0	3	93	A metallic	Metallic photonic	2002		CRYSTALS; DIPOLE; MPBG	CHINESE PHYSICS LETTERS	COMMNICATIONS	TELEMETRY	6.2	5

641	0	8	97	Rb-3 C-60	Preparati on and	2002		ELECTRONIC-PROPERTIES;	CHINESE PHYSICS LETTERS	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	4
642	0	2	146	The influen	Effect of N-2	2002		CHEMICAL-VAPOR-	CHINESE PHYSICS LETTERS	PHYSICS	SOLID STATE PHYSICS	6.1	5
643	6	8	135	Senescenc	Identifica tion of a	2002	coriander; leaf senescence;	LEAF SENESCENCE;	CHINESE SCIENCE BULLETIN	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	4
644	0	7	126	The renorn	Renorma lization	2002		PARTICLE-PRODUCTION;	CLASSICAL AND QUANTUM GRAVITY	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	5
645	0	0	23	In the pres	The ranges	2002			COMMUNICATIONS IN ALGEBRA	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	2
646	7	2	167	A telecomr	A location-	2002	location; routing; threshold	OPTIMIZATION; ALGORITHM	COMPUTERS & INDUSTRIAL	BEHAVIORAL & SOCIAL SCIENCES	ADMINISTRATION & MANAGEMENT	6.3	4
647	10	3	36	This paper	Inverse scatterin	2002	uniqueness; transmission	OBSTACLE SCATTERING;	COMPUTERS & MATHEMATICS WITH	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.2	4
648	5	16	355	Objectives:	Micro-tensile	2002	micro-tensile; sclerotic dentin;	ELECTRON-MICROSCOPIC	DENTAL MATERIALS	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	4
649	17	6	112	The voltam	Voltamm etric	2002	salicylate; cinnamate;	CARBONYL-COMPOUNDS;	ELECTROANALYSIS	ELECTROTECHNOLOGY & FLUIDICS	ELECTRICAL & ELECTRONIC EQUIPMENT	6.1	4
650	0	6	87	A method c	Controlli ng global	2002		AREA-PRESERVING	EUROPEAN PHYSICAL JOURNAL	MATHEMATICAL & COMPUTER SCIENCES	STATISTICS & PROBABILITY	6.1	5
651	5	3	171	Sulfur relea	Promotio n of	2002	ferrous sulfate; sulfur; coal	IRON; LIQUEFACTION;	FUEL	PROPULSION, ENGINES & FUELS	FUELS	6.1	5
652	4	5	75	The non-ca	Controlle d partial	2002	methane; methanol;	TEMPERATURE-PROGRAMMED	FUEL	PROPULSION, ENGINES & FUELS	FUELS	6.1	5
653	8	0	93	In the last c	Liquid metal	2002	liquid metal blanket; MHD		FUSION SCIENCE AND TECHNOLOGY	NUCLEAR SCIENCE & TECHNOLOGY	FUSION DEVICES (THERMONUCLEAR)	6.2	4
654	9	4	175	Negative sl	Numeric al	2002	case history; numerical	NEGATIVE SKIN FRICTION;	GEOTECHNIQUE	EARTH SCIENCES & OCEANOGRAPHY	SOIL MECHANICS	6.2	5
655	10	1	214	Many recer	Concurre ncy	2002	real-time databases;	SYSTEMS	IEEE TRANSACTIONS ON COMPUTERS	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.2	4
656	5	1	55	Upper boul	A simple upper	2002	Huffman code; prefix code;	BINARY	IEEE TRANSACTIONS ON INFORMATION	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	5
657	16	5	210	Solid lipid r	Preparati on of	2002	solvent diffusion method in	INTRAVENOUS FAT EMULSIONS;	INTERNATIONAL JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.1	4
658	0	6	62	Let F be a	Normal families	2002		SHARING VALUES; PICARD	ISRAEL JOURNAL OF MATHEMATICS	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	4
659	5	0	99	The dielect	Ferroele ctric,	2002	BLSF; ferroelectrics;		JAPANESE JOURNAL OF APPLIED PHYSICS	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
660	0	12	213	Akt2 is a m	Positive feedback	2002		PROTEIN-KINASE-B;	JOURNAL OF BIOLOGICAL	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5

661	14	15	161	The steric	Steric mass-	2002	affinity adsorbents; steric mass action;	ION-EXCHANGE CHROMATOGRA	JOURNAL OF CHROMATOGRAPHY	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	4
662	12	6	241	We consid	A multiple-	2002	parallel computing; collision system;	MOLECULAR-DYNAMICS;	JOURNAL OF COMPUTATIONAL	CHEMISTRY	PHYSICAL CHEMISTRY	6.2	3
663	10	18	154	A kind of in	Inorganic-organic	2002	inorganic-organic hybrid;	FILM-MODIFIED MICROELECTRO	JOURNAL OF ELECTROANALYTICA	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
664	0	2	144	A new spec	A new species	2002		CLASSIFICATION ; PHYLOGENY	JOURNAL OF HERPETOLOGY	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	5
665	9	13	136	A model is	A model for	2002	chemical potential; grain size; lattice	BOUNDARY DIFFUSION;	JOURNAL OF MATERIALS	PHYSICS	CRYSTALLOGRAPHY	6.1	5
666	0	1	115	The microv	Low-fired microwa	2002		MICROSTRUCTU RE	JOURNAL OF MATERIALS SCIENCE-	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
667	5	14	234	Bifidobacte	Cytoskel eton	2002	Bifidobacterium; macrophage	LACTIC-ACID BACTERIA;	JOURNAL OF MICROBIOLOGY AND	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	4
668	6	8	116	A new simp	Determin ation of	2002	laser irradiation; DNA; pyrimidine	PERFORMANCE LIQUID-	JOURNAL OF PHARMACEUTICAL	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	3
669	0	16	298	The duratic	Cytoskel etal actin	2002		PRESSURE-OVERLOAD	JOURNAL OF PHYSIOLOGY-	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	4
670	0	19	307	The kinetic	Kinetics and	2002		ELECTRON-TRANSFER	JOURNAL OF THE CHEMICAL SOCIETY-	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
671	8	3	203	A wind tunn	Wind-induced	2002	wind-induced responses;	LATERAL-TORSIONAL	JOURNAL OF WIND ENGINEERING AND	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	STRUCTURAL ENGINEERING & BUILDING	6.2	4
672	0	0	86	Because a	Crystal structure	2002			MAIN GROUP METAL CHEMISTRY	PHYSICS	CRYSTALLOGRAPHY	6.1	3
673	17	12	250	The develo	Repressi on	2002	Xenopus; myogenesis; myf-	SKELETAL-MUSCLE;	MECHANISMS OF DEVELOPMENT	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	4
674	11	4	87	We consid	Divergen ce	2002	divergence structure for the	NEWMAN BLACK-HOLE; QUANTUM	MODERN PHYSICS LETTERS A	PHYSICS	QUANTUM THEORY & RELATIVITY	6.1	4
675	9	3	180	The max-b	A determini	2002	square-root barrier function;	NEURAL NETWORKS;	NEURAL NETWORKS	MATHEMATICAL & COMPUTER SCIENCES	CYBERNETICS	6.1	4
676	0	15	120	4-(N,N-Dim	Novel heteroge	2002		PHOTOINDUCED ELECTRON-	NEW JOURNAL OF CHEMISTRY	CHEMISTRY	RADIATION & NUCLEAR CHEMISTRY	6.1	4
677	9	10	110	A theoretic	Theoreti cal study	2002	secondary electron emission;	METAL-SURFACES;	NUCLEAR INSTRUMENTS &	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	4
678	11	3	90	All-optical 2	Theoreti cal	2002	semiconductor optical amplifier	WAVELENGTH CONVERSION;	OPTICS AND LASER TECHNOLOGY	PHYSICS	OPTICS	6.1	4
679	9	4	130	The behavi	The behavior	2002	entangled atom; level-split;	BELL THEOREM; QUANTUM;	PHYSICA A	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
680	11	12	151	Using a ha	Energy and	2002	charged multiplicity;	HEAVY-ION COLLISIONS;	PHYSICS LETTERS B	PHYSICS	NUCLEAR PHYSICS & ELEMENTARY PARTICLE	6.1	5

681	8	17	211	Rice (Oryz	Respons e of rice	2002	aluminum; backcross inbred	TRITICUM-AESTIVUM L;	PLANT AND CELL PHYSIOLOGY	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	3
682	7	0	160	A two-fluid-	Simulatio n of 3-D	2002	two-fluid model; gas-particle flows;		POWDER TECHNOLOGY	PHYSICS	FLUID MECHANICS	6.1	2
683	10	1	168	In order to	Effect of NAG7	2002	NAG7 gene; cell transfection; gene	EXPRESSION	PROGRESS IN BIOCHEMISTRY AND	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	4
684	10	4	127	Being cultu	Preparati on of	2002	rETIa; high cell density; affinity	TISSUE PLASMINOGEN-	PROGRESS IN BIOCHEMISTRY AND	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.1	3
685	7	5	127	The low-aff	Localizati on of low-	2002	p75 neurotrophin receptor; retina;	NERVE GROWTH-FACTOR; CELL-	PROGRESS IN BIOCHEMISTRY AND	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	3
686	11	8	154	n-Alkanes	A study of the	2002	anesthesia; partition; n-	VOLATILE ORGANIC-	REGULATORY TOXICOLOGY AND	BIOLOGICAL & MEDICAL SCIENCES	TOXICOLOGY	6.2	4
687	0	10	140	We have in	Sr doping	2002		STRUCTURAL TRANSITION;	SUPERCONDUCTOR SCIENCE &	PHYSICS	SOLID STATE PHYSICS	6.1	4
688	11	6	264	Titanium m	Structure and	2002	titanium oxide; microstructure;	TITANIUM-OXIDE FILMS;	SURFACE & COATINGS	MATERIALS	COATINGS, COLORANTS & FINISHES	6.1	3
689	8	7	164	A new sulfo	Anthraqu inone-2-	2002	anthraquinone-2-sulfonyl chloride;	PERFORMANCE LIQUID-	TALANTA	CHEMISTRY	INORGANIC CHEMISTRY	6.1	3
690	9	6	201	Twelve Ne	Newcastl e	2002	Newcastle disease virus; fusion	HEMAGGLUTININ-NEURAMINIDASE	VETERINARY MICROBIOLOGY	AGRICULTURE	ANIMAL HUSBANDRY & VETERINARY MEDICINE	6.2	4
691	0	15	331	AIM: To co	P53 immuno	2002		CELL LUNG-CANCER;	WORLD JOURNAL OF GASTROENTEROLOG	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.2	4
692	0	15	296	AIM: Both I	DNA immuniz	2002		CARRYING PRES EPITOPES;	WORLD JOURNAL OF GASTROENTEROLOG	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.2	4
693	0	14	437	AIM: To ob	Expressi on of	2002		LIPOPOLYSACC HARIDE-BINDING	WORLD JOURNAL OF GASTROENTEROLOG	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	4
694	0	2	117	A small DN	Expressi on,	2002		SULFOLOBUS-ACIDOCALDARIU	ACTA CRYSTALLOGRAPHIC	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
695	14	2	159	A multi-con	Multi-compone	2002	flow injection analysis; CCD-	REGRESSION; WATER	ANALYTICA CHIMICA ACTA	BIOLOGICAL & MEDICAL SCIENCES	TOXICOLOGY	6.1	4
696	0	2	141	The metallo	Electroc atalytic	2002		MONOLAYERS; OXIDATION	ANALYTICAL SCIENCES	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
697	17	5	35	Some nece	Some converge	2002	accretive mapping; pseudo-	OPERATOR-EQUATIONS;	APPLIED MATHEMATICS AND	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	3
698	10	0	87	The structu	Role of undergro	2002	blast-resistant structure; dynamic		APPLIED MATHEMATICS AND	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	STRUCTURAL ENGINEERING & BUILDING	6.2	4
699	9	0	151	Accurate m	Perform ance	2002	stratification; partitioned storage		APPLIED THERMAL ENGINEERING	MECHANICAL, INDUSTRIAL, CIVIL & MARINE	AIR CONDITIONING, LIGHTING, HEATING, &	6.2	4
700	10	19	245	We perform	Spectros copic	2002	galaxies : Seyfert; quasars : emission	LINE SEYFERT-1 GALAXIES;	ASTRONOMICAL JOURNAL	ASTRONOMY & ASTROPHYSICS	ASTRONOMY	6.1	4

701	10	5	115	At present,	Seconda ry	2002	secondary structural wobble;	AMINO-ACID-SEQUENCE;	BIOCHEMICAL AND BIOPHYSICAL	BIOLOGICAL & MEDICAL SCIENCES	BIOCHEMISTRY	6.2	5
702	12	3	190	Secondary	Structura l	2002	hemoglobin; structural change;	SPECTROSCOPY ; MECHANISMS;	BIOPHYSICAL CHEMISTRY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.2	3
703	0	0	28	Pseudephe	Pseudep hemeru	2002			BRYOLOGIST	BIOLOGICAL & MEDICAL SCIENCES	BIOLOGY	6.1	3
704	6	3	316	BACKGRO	Cytologic findings	2002	angioimmunoblasti c; T-cell	LYMPHADENOPA THY-LIKE	CANCER CYTOPATHOLOGY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	3
705	17	9	125	The M (M =	M/BCS (M = Ni,	2002	Ni or Co catalysts; BaCl2-modified	SELECTIVE OXIDATION;	CATALYSIS LETTERS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
706	7	4	193	The Ni-B/S	Glucose hydrogen	2002	glucose; hydrogenation; Ni-	SELECTIVE HYDROGENATIO	CATALYSIS TODAY	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
707	11	15	136	An alumina	Methane decompo	2002	catalytic decomposition of	FEITKNECHT COMPOUND	CATALYSIS TODAY	CHEMISTRY	ORGANIC CHEMISTRY	6.1	4
708	8	1	125	The endoh	Isolation and	2002	endohedral metallofullerene;	HIGH-YIELD	CHEMICAL JOURNAL OF CHINESE	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
709	8	5	74	On the hon	The Behavior	2002	microchip; laser-induced	GLASS CHIPS; MICROCHIP;	CHEMICAL JOURNAL OF CHINESE	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	4
710	6	6	80	Iodothyroni	Compute r	2002	iodothyronine deiodinase; single-	CONTAINING CATALYTIC	CHEMICAL JOURNAL OF CHINESE	BIOLOGICAL & MEDICAL SCIENCES	ANATOMY & PHYSIOLOGY	6.1	4
711	11	0	70	The effect	Applicati on of 2D	2002	rare-earth ion; hemoglobin;		CHEMICAL JOURNAL OF CHINESE	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	3
712	10	12	122	The metho	Preparati on of the	2002	composite electrode; carbon-	PTFE O-2-FED CATHODE;	CHEMICAL JOURNAL OF CHINESE	ENVIRONMENTAL POLLUTION & CONTROL	WATER POLLUTION & CONTROL	6.1	4
713	8	0	85	Relationshi	Relation ships	2002	silazane compound;		CHEMICAL JOURNAL OF CHINESE	CHEMISTRY	INORGANIC CHEMISTRY	6.1	3
714	0	5	100	Double wal	Double wall	2002		MATERIALS SCIENCE;	CHEMICAL PHYSICS LETTERS	POWER PRODUCTION & ENERGY CONVERSION	ELECTROCHEMICAL ENERGY STORAGE	6.1	3
715	0	1	104	In this work	Preparati on of	2002		LITHIUM	CHEMICAL PHYSICS LETTERS	POWER PRODUCTION & ENERGY CONVERSION	ELECTROCHEMICAL ENERGY STORAGE	6.1	4
716	0	1	34	Fibrous an	Fabricati on of	2002		SYSTEMS	CHEMISTRY LETTERS	CHEMISTRY	INORGANIC CHEMISTRY	6.1	3
717	10	5	330	The residu	Evaluatio n of	2002	Pb/Zn mine; toxicity; root	ROOT ELONGATION;	CHEMOSPHERE	ENVIRONMENTAL POLLUTION & CONTROL	SOLID WASTES POLLUTION CONTROL	6.2	3
718	12	1	167	A series of	Laborato ry	2002	Jupiter's Great Red Spot; rotating	MODEL	CHINESE ASTRONOMY AND	ASTRONOMY & ASTROPHYSICS	ASTRONOMY	6.1	5
719	11	2	106	Pd/gamma	Effect of transition	2002	anthraquinone; hydrogenation;	CU; MODEL	CHINESE JOURNAL OF CATALYSIS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5
720	8	0	166	The synthe	In-situ FT-IR	2002	formaldehyde; acetaldehyde;		CHINESE JOURNAL OF CATALYSIS	CHEMISTRY	PHYSICAL CHEMISTRY	6.1	5

721	0	13	275	Backgroun	Determin ation of	2002		PERFORMANCE LIQUID-	CLINICAL CHEMISTRY	BIOLOGICAL & MEDICAL SCIENCES	MEDICINE & MEDICAL RESEARCH	6.1	3
722	9	7	84	A homoger	Evaluatio n of	2002	analytical modelling;	WEAVE FABRIC COMPOSITES;	COMPOSITES PART B-ENGINEERING	MATERIALS	LAMINATES & COMPOSITE MATERIALS	6.1	3
723	7	17	62	Maximum (	A survey on	2002	maximum distance holey packings;	GENERALIZED STEINER	DISCRETE APPLIED MATHEMATICS	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	4
724	6	2	90	In 1993, Br	On incidenc	2002	cubic graph; incidence coloring;	STAR ARBORICITY	DISCRETE MATHEMATICS	MATHEMATICAL & COMPUTER SCIENCES	NUMERICAL MATHEMATICS	6.1	4
725	10	0	68	A new stat	Wavelet-based	2002	stator ground fault protection;		ELECTRIC POWER SYSTEMS	POWER PRODUCTION & ENERGY CONVERSION	ELECTRIC POWER PRODUCTION &	6.1	4
726	18	13	258	The protec	Delineati on of the	2002	2;4-dinitrobenzene sulfonic acid	INFLAMMATORY BOWEL-	EUROPEAN JOURNAL OF	BIOLOGICAL & MEDICAL SCIENCES	PHARMACOLOGY	6.1	5
727	12	10	270	A new metl	Alternate watering	2002	water use efficiency; soil	XYLEM SAP ABA; STOMATAL	FIELD CROPS RESEARCH	AGRICULTURE	AGRICULTURAL ENGINEERING	6.1	5
728	6	13	297	Members c	Characte rization	2002	retinoic acid binding protein;	RECEPTOR MESSENGER-	GENE	BIOLOGICAL & MEDICAL SCIENCES	GENETIC ENGINEERING & MOLECULAR BIOLOGY	6.1	5
729	11	0	92	The experi	Quantum explanati	2002	reflection of laser(photons);		HIGH ENERGY PHYSICS AND	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	4
730	11	0	78	Using mod	Studies on the	2002	deformed HF state; angular		HIGH ENERGY PHYSICS AND	PHYSICS	ATOMIC & MOLECULAR PHYSICS &	6.1	5
731	6	0	79	Crystallizat	Low dielectric	2002	low-sintering temperature; high		HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
732	5	10	100	SrLi1/4Nb3	Effect of SrLi1/4N	2002	PbxSr1-xTiO3 ceramics; NTCR;	POSITIVE TEMPERATURE-	HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
733	12	0	129	This paper	Analysis and	2002	multilayer piezoelectric		HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	4
734	9	7	125	The solid e	Superion ic	2002	solid electrolyte; sulphur sensor;	AUXILIARY ELECTRODE;	HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	4
735	4	0	155	SrCO3, Al(	Preparati on of	2002	sol-gel; phosphor; afterglow; spectra		HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	4
736	4	4	147	Based on t	Investiga tion of	2002	sialon refractory; alumina-mullite;	ELEVATED NITROGEN	HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
737	7	1	100	microstruct	Microstru cture	2002	Al2O3/SiC; spark plasma sintering;	CERAMICS	HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
738	4	0	142	The effects	Effects of	2002	laminated ceramics; Si3N4;		HIGH-PERFORMANCE	MATERIALS	LAMINATES & COMPOSITE MATERIALS	6.1	5
739	7	0	88	Two glasse	Effect of fluorine	2002	fluorine content; crystallization;		HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
740	6	10	56	This paper	Synthesi s,	2002	mesoporous materials; nano-	MOLECULAR-SIEVES;	HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5

741	5	1	130	Mg-Zr amo	Distributi on of	2002	MgO-ZrO2 powder;	ZIRCONIA	HIGH-PERFORMANCE	MATERIALS	METALLURGY & METALLOGRAPHY	6.1	5
742	6	0	93	Alumina co	An experime	2002	static combustion synthesis; ceramic		HIGH-PERFORMANCE	MATERIALS	COATINGS, COLORANTS & FINISHES	6.1	5
743	6	5	125	Reaction si	Study on slip	2002	slip casting; sialon; rheology; shear	BETA-SIALON; CERAMICS;	HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5
744	8	1	113	Pulse elect	Heteroge neous of	2002	pulse electric current sintering;	MICROSTRUCTU RE	HIGH-PERFORMANCE	MATERIALS	CERAMICS, REFRACTORIES & GLASS	6.1	5